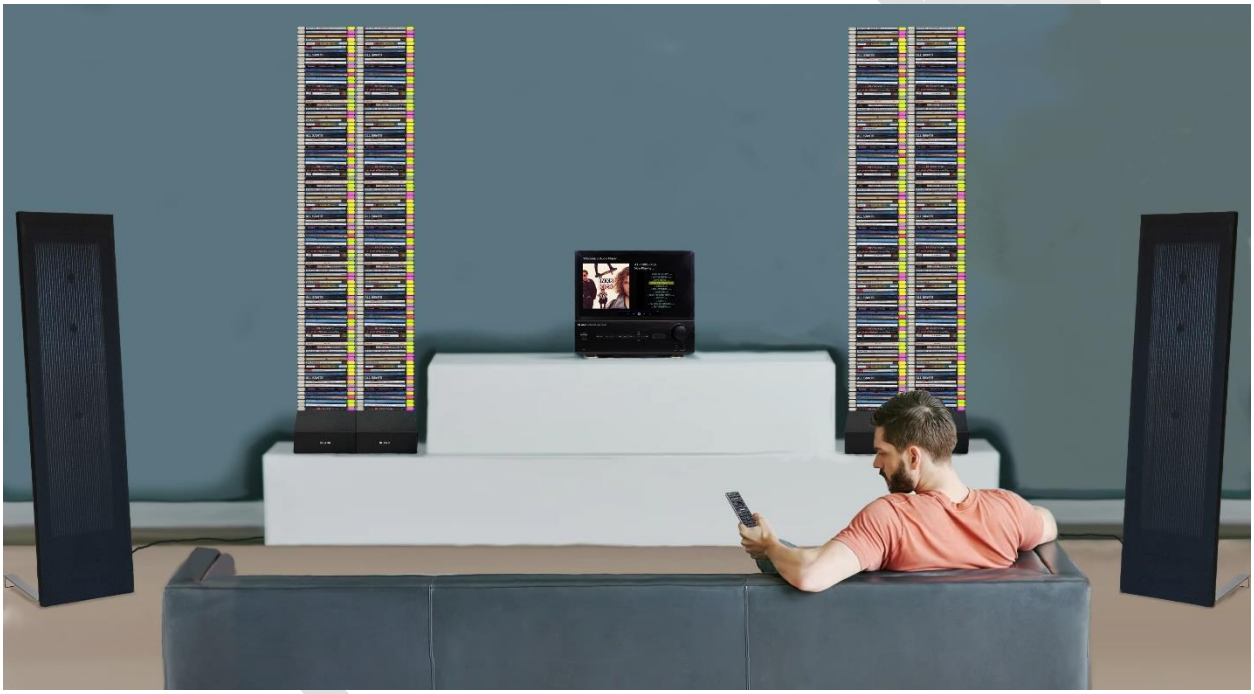
The Rack System

A new way of listening to music



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‘Imagination is more important than knowledge.’
— Albert Einstein

I.M.I.T.K.

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THE RACK SYSTEM

Part One: Introductory Remarks

Introduction

If you're an audiophile like me then you have probably amassed hundreds, if not thousands, of LPs, tapes, and CDs over the years. They tend to take up a lot of space, and often one is left with no choice but to offload part of the collection in order to make space so other items can be added.

How much better would it then be if we could find a smaller, physical format that takes up less space whilst till retaining the quality of the sound, if not improve upon it.

Over the following pages that's exactly what we will do: look at a new system for producing sound and storing it in a physical format that is smaller and therefore more convenient. We will also contrast this with previous and currents systems available so we can determine if the new system is viable or not.

Current Formats Available

Vinyl records: Although vinyl died out back in the late eighties and nineties, thanks to the advent of CDs, it soon made a comeback, with the back catalogues of many record companies now being repressed, this time on heavier vinyl. The common weight of an LP (Long Player) is 180 grams. Well, if you have, say, 1,500 in your collection, that is a total combined weight of 270 kilos; that is one hell of a weight to carry around if, like me, you are in the habit of moving from place to

place. Also, we cannot neglect the cardboard sleeve and inner sleeve which will add to the total weight considerably.

‘Happiness is a huge record collection.’
— Henry Rollins, former singer of punk band, Black Flag

Everyone knows a vinyl LP is 12 inches in diameter, but the actual sleeve, which has to be bigger to house the LP, is on average 12.375 inches (or, if you prefer, 31.43cm) square. The width of the spine can vary considerably, depending on whether the LP is a single or a double, in a single or a gatefold sleeve. If we take the average of around 4mm thick, then times that by 1,500, that is 6,000mm, or 60cm, of shelf space is taken up to accommodate all those LPs in your collection. And I know some music fans who have well over 10,000 LPs stashed all over the place who know what a chore it is to keep them safe, away from heat, moisture, etc., so they do not warp or get damp. And let us not forget the old DJs who still play vinyl. Some have so many that they are boxed up in garages as they don’t have enough space for them in the home.

Further, we mustn’t forget the humble 7 inch single. I used to have over 600 in my collection, from various genres, and typically they used to play at 45 rpm, although I did have a few which ran at 33⅓ rpm so more music could fit on the disc. The average weight of a 7-inch single is around 40 grams. That is 24,000 grams, or 24 kilos. And much more if we add into the equation the sleeve. This will vary depending on whether the sleeve is plain, with the centre missing for the label to be exposed, or a picture sleeve, and whether it is made from paper or card. The average size of a sleeve is 7.08 inches, and about 2mm thick. If lined up on a shelf they will take up 1200mm. There’s also the 10-inch format which is not so popular. However, there are still thousands in existence so they must be taken into account as well.

Compact Discs: A typical Compact Disc (CD) weighs around 15 to 20 grams, which works out about a ninth of the weight of an LP. However, the weight is dependent on several factors, like the number of pages contained in the booklet, what artwork is included, the type of case used. There are many types, depending on how the CD is being marketed, but the standard is the jewel case of which there are 3 types (Original jewel case, CD-single or Slimcase). There is also the Paper sleeve, Q Pack, Digipak, FLPpak, Digisleeve, Digifile, Wallet, etc. (See Appendix for details.) What type of packaging will affect the overall weight so some CDs maybe a lot heavier. If you have, say, 600 CDs in your collection, that could amount to around 1,200 grams, or 1.2 kilos. The average size of a CD case measures 5.59 (width) x 4.92 (height) x 0.39 (depth) inches. When neatly stacked side by side on the shelf in a row, like a line of books, the CDs will take up 234 inches, going by the thickness of the case measuring 0.39. Again, that is a lot of space. And we must not neglect to take into account the width and height.

Many people have come up with all sorts of storage solutions for their cherished CDs with firms offering makeshift shelving. Wood Technologies sell a wall unit that stores 1200 CDs (or a smaller version for 600 CDs). Chris Sharp Cabinets, based in the U.K., make a shelf that holds 296 CDs (a smaller version holds 148 CDs). Jeremy Barnes makes wall-mounted CD shelves which hold up to 330 CDs (see pic below). And Wilkins & Kent in Australia makes CD cabinets in various sizes, storing 300 to over 1,000 CDs.

In the U.S. Topdeq sells Cubos CD racks that hold 40 CDs per shelf. They come in 6-shelf and 11-shelf versions. Or you can buy CD cabinets that store 480 CDs in 12 drawers. Lombok has CD cabinets in two styles, and two sizes. Charles Matts makes a different type of CD cabinet. Made

of steel, the Can-Am cabinets, with two to four drawers, holds 270 CDs per drawer. Lastly, Bisley makes cabinets designed for CDs; each drawer holds 120 of them, arranged in three rows.

Three CD bookcases mounted to the walls.

Although these storage solutions may be practical and aesthetically pleasing, they not only take up more space than the CDs themselves, but they also add to the cost for storing them.

Tape cassettes: These may have died out, having been replaced by CDs many years ago, but I know plenty of diehard fans who still prefer the old cassettes, loving the sound of the hiss as it reminds them of precious childhood memories. Having everything on tape was part of their growing up experience, and it was more economically viable as blank tapes could be bought cheaply, whereas a pre-recorded tape would cost around the same as a LP. Therefore, if you could not afford to buy the LP, it was another way of having it by getting a copy on tape by borrowing LPs from friends or hiring them from the local library, as I used to do. A blank tape also enabled us to record stuff off the radio, so that was another convenient way of listening to music. Home tape recording became such a threat to the record industry back in the eighties many companies started getting worried and anxious. Everyone was taping rather than buying music, meaning the companies were losing out on precious royalties, leading to the highly suspect probability of undermining the music industry as a whole. Even recording artistes were protesting, begging us to

stop recording and buy their music instead. The knock-on effect would be the upping of prices of LPs and CDs as a way of solving the problem, with the consequent effect of costs being passed onto customers. Taped copies were often referred to as ‘pirates’ to underline the fact that they were illegal, with the distinct possibility of being prosecuted just for having some in your possession.[1]

Blank tapes for recording audio, the most popular being C60s and C90s.

Originally developed by the Dutch electronics firm Philips in 1963, the compact cassette became part of the fabric of yesterday’s youth with fans often taking a blank tape to a concert, recording an audio copy of the show, then selling it afterwards as a bootleg. The benefit of these audio tapes was that it made it possible to do a copy of a copy with little deterioration in sound quality.

An original Sony Walkman from 1979.

The introduction of the Sony Walkman tape player (above), which was small, lightweight and compact, and easy to carry around, caused a revolution in the music industry. It was released in 1979 and became a veritable mobile fashion accessory once it reached the height of its popularity

[1] Check out Bow Wow Wow’s hit single *C·30 C·60 C·90 Go!* (1980), the world’s first-ever cassette single (a 7-inch vinyl version was released months later). Their record company EMI did not promote the ‘cassingle’ due to its lyrics (‘Off the radio I get constant flow/Hit it, pause it, record and play/Turn it, rewind and rub it away’) as the song promoted home taping when music piracy was very much a hot-potato issue, highlighting the paranoia surrounding this controversy.

by the mid-eighties. Commuters on the London underground wouldn't be seen without one; everyone sat there with their headphones on, nodding to music only they could hear.

Some people I know refuse to sell their tapes, and cannot bear to part with their treasured collection, although I parted with mine a long time ago, not before however converting them all to MP3s. Mine ended up in the bin, regrettably, but I was pleased to get back all the space their absence made available. The hundreds of tapes I did have were stored in several boxes and was, as far as I was concerned, a waste of valuable space. The standard cassette case size is 4.25 (height) x 2.75 (width) x 0.6 (depth) inches. If you have about 400 tapes, as I did, all lined up on your shelf, that is 240 inches of space taken up for the benefit of your music listening. A 90-minute cassette in a case with J card weighs around 79 grams. Four hundred of these would have a combined weight of 31,600 grams, or 31.6 kilos. That is a lot of weight. Also, like CDs, there were specially designed drawers and cabinets available to hold your tapes, like the three-drawer solution below:

It may look attractive and tidy but imagine if you have hundreds of tapes. You would have to buy more of these drawers. Not only do they take up more space, but they also add to the cost of storage considerably. There are other solutions. However, what we don't want is these solutions to cost a multiple amount of money when compared to what's stored in them. What would be the point of that? As a friend opined recently: 'My problem has always been that I need to store around 50 or more metres of CDs, 20 metres of LPs, about 15 metres of CDs, and about 10 metres of tapes in a system that is going to be flexible (I tend to move around to new places), affordable, i.e. cheap, as I don't want to pay more for the system than what it contains, durable so that it lasts and I will not need to buy a new system every few years, expandable in every which way so that I can keep adding to it, and lastly, that is available for a decade or more so that in the future I can keep continuously expand my shelving system.' Well, guess what? The Rack System meets all these criteria, and more (see below). 'Once you take these aspects into consideration, you're talking about an extremely limited choice, even worldwide,' he added.

Not if you adopt the Rack System.

MiniDisc: Does anyone remember the old MiniDisc? This audio format was released by Sony back in November 1992 and ceased production March 2013. It was designed to replace the old cassette tape, but never reached its popularity, although it was very successful in Japan. If anyone still has a MiniDisc player, and a collection of MiniDiscs, then this might be relevant. The MiniDisc outer case measures 110mm x 90mm x 14mm. If you have 200 in your collection, then they will take up 2,800mm of space on your shelf if stacked neatly like books in a bookcase. Again, that is a lot of space.

8-track cartridges: Lastly, I know these are now obsolete, but when I was a kid, 8-track cartridges were very popular. My father used to have a player in his car. You simply inserted the cartridge and pressed ‘play’ and you had music on the go. They reached their peak around the end of the late sixties and early seventies, but soon faded out after that, to be replaced by other formats which were gaining in popularity, like the cassette tape and CDs. These were better suited to people’s mobile listening habits, especially tapes.

The 8-track cartridge measured 5.25 x 4 x 0.8 inches. In a case, the average width was about 0.10 inches, or just under an inch. If you have 50 in a row, that’s about 50 inches of space taken up.

I never had any in my collection, but that is worth bearing in mind, especially if you still have some lying around. And I know a few people who still do.

Physical versus Digital

The above has been necessary to prove a point when examining the various music formats available. All of these require a lot of space and can, in the case of LPs, take up a ton of weight. Unless you prefer to only download or stream music from the various websites available (like Spotify, etc., see below) then you have nothing to worry about, except perhaps the space available on your hard-drive and the quality of your internet connection. A digital copy of an album in MP3 format is typically around 45MBs. Not much to consider, although the sound has been greatly compressed to make the file size as small as possible. Compact Discs provide the highest quality of audio–so far. The bitrate on a CD is over 1400 while the bitrate on downloadable music is below 300. This means that CDs have 4 times the clarity compared to streaming. Audio MP4s fare better as there is an enhancement of audio quality, yet they can be around 200MBs as the compression is not so extensive.

Streaming Music Service Providers

Six of the most popular streaming service providers.

Here follows a quick breakdown of what each of these streaming service providers offers, for those who don't already know, and is useful for giving some comparisons. Depending on what you are looking for in each service, you may find some are better than others.

Qobuz's streaming service offers music in hi-res, and fancies itself as the home for true music fans. But it comes at a cost as it is a subscription service. Its Studio Premier plan works out at $14.99 per month, providing high-quality (16-bit/44kHz to 24-bit/192kHz) FLAC files which translate into some seriously good sound. Not cheap though, but it does boast 100 million tracks on its site.

YouTube Music is the successor to Google Play Music. It is a music streaming service offered by the video platform YouTube, a subsidiary of Google. It is easy to use with a user interface that allows music fans to explore songs/music videos on YouTube based on genres, playlists, and its own recommendations, with millions of music videos to choose from. This is different from YouTube itself where you will also find music, but many other types of videos besides. Like

Spotify, it has a subscription, offering an ad-free service, called YouTube Premium, which starts at around $14 per month.

Technically the oldest traditional music streaming service is Deezer, a French-based music service that was first launched in 2007. The company has been a subsidiary of Access Industries since 2016. Deezer is available via web and on various digital platforms, including Android, iOS, macOS and others. Its subscription plans provide access to exclusive content, including live performances and original podcasts. For those looking for hi-res audio you can do no better than start here. Be prepared to pay around $10.99 a month.

Amazon Music, the music streaming platform and digital music store operated by Amazon, has probably the largest number of subscribers. As of January 2020, it boasted 55 million. It was the first music store to sell music without digital rights management from the four major music labels, as well as many independents.

Apple Music offers great quality and a huge catalogue. However, it's best used with Apple hardware as it is an audio and video streaming service developed by Apple Inc. Users select music to stream to their device on-demand, or they can listen to existing playlists. It is by far the biggest name here, dwarfing all other services mentioned above so far. It is second only to Spotify for its number of subscribers, but it has one of the most full-featured services around, touting 90 million songs in lossless quality. Its Apple Lossless Audio Codec file format sounds richer and crisper than compressed, lossy MP3s. A special flag notates when it's using the original masters. However, it is more expensive than other streaming services.

Spotify has been one of the most popular music streaming services around for years. It's great for discovering new music and podcasts. Its 'Discover Weekly' playlist will automatically find new music you'll love, based on previous listening experiences. It also provides one of the simplest user-interfaces to navigate. You can quickly find the music you want and easily build playlists. You can download songs, albums, podcasts, even playlists for offline listening. Although downloads can take up storage space on your device, it's a great option if your Wi-Fi connection isn't that reliable all the time. There was talk back in early 2021 that it would be offering a high-definition audio service, yet this still hasn't happened, whereas other services are offering the same high-definition audio as standard. This is the only drawback: no high-resolution audio.

I, personally speaking, have never been a big fan of either streaming or downloading music as the digital copy is not the same as having the real thing. Even to this day, I still miss the smell of vinyl. Combined with the smell of a freshly printed sleeve that has been wrapped in cellophane, taking it home and opening it, and getting a whiff of that smell, is all part of the experience of being a record collector. Then getting the record out of its sleeve, holding it in your hands, carefully ensuring you only hold it by the edges, and laying it down on the platter of your turntable, watching it spin, seeing the stylus coming down and landing on the vinyl, then getting to hear the opening

track, etc., it is a great thrill for any music fan, even if it is on some cheapo record player. Being physically able to see where the sound is coming from is a great bonus. With a digital version there is nothing to see except a file on your computer, although some media players have attempted to replicate the format of records by having an animated disc spinning, just like vinyl. Either way, I think of a digital copy of a track as being like a ghost: you cannot touch it or smell it. It has no identity, and because it will always remain only a digital copy, you cannot boast in possessing it like you could do with a CD or LP. Also, anyone can have a digital copy of music. All you have to do is search online and you will find it. This defeats the object of going to the record store, flicking through its vast collection of CDs and LPs, finding something interesting, something you may never have heard of before, judging by the cover, the title tracks, composers, etc., buying it on the off-chance it might be interesting and taking it home only to discover you have come across a gem of a record/CD.

Perhaps I am too set in my ways now. Downloads, in my opinion, are the worse format to listen to music. They sound absolutely crap when compared with the sound quality of a vinyl record or even a CD. You notice the difference straight away. And, as I said, you never really feel like you own the music. You cannot hold a download in your hands, like you can with a record or CD, or read through the liner notes, or smell the artefact, or organise the cases/sleeves on your shelves. For me this is part of the enjoyment of buying the record/CD, actually owning the product, being able to hold it, knowing it is yours. And you can only do that by visiting the stores.

A Personal Recollection of Record Shops

Selectadisc, 19 Market St, Nottingham, NG1 6HX, during its heyday.

Years ago, when I was living in Derby and earning good money, I would often to get the train to Nottingham, at least every other month or so, to check out Selectadisc, one of the best record shops in the Midlands. It had 2-3 floors of music. Usually on pay day, when I was feeling rich, I would walk in there and just browse, going through all the sections, from R'n'B, Jazz, Punk, Goth, New Wave, Industrial, Avant Garde, Rockabilly, Soundtracks, New Releases, etc., to see if I could find anything interesting that I didn't already have in my collection. Invariably, I would end up

spending half of my wages in a couple of hours. Walking out of there with bags full of records/CDs was a great thrill. I wasn't bothered that I had spent over 300 quid. I was delighted to have picked up some gems I had never heard of, like the *Nasty Rockabilly* series with their interesting covers containing stills taken from the stag films of the period (the series is now available in a 10 CD box set), or the re-release of *Glastonbury Fayre Festival* (orig. 1972, reissue 2007), a triple LP set which came in a fourfold cardboard poster-cover with replicas of all the original material including a 32 page illustrated booklet, foldout cut-out silver pyramid insert, foldout cut-out geodesic dome insert, foldout track listing insert, poster with photos, and housed in a custom printed PVC outer sleeve, or the many bootlegs you never see advertised anywhere. I couldn't wait to get home and listen to them. Most of the time I was pleasantly surprised, pleased I had been successful in my pilgrimage to the Mecca of Music. But that all changed on Saturday 28 February 2009 when it was announced that after over 40 years of trading in Nottingham, the legendary music shop Selectadisc was going to close at the end of March that year. A great shame. Why? Why does any shop close? The reasons are usually down to economy: it cannot sustain a profit and with the overheads, it is no longer viable to stay open. As the manager Phil Barton explained: 'The shop has been basically uneconomic for the last two years. We've been trying to keep it going more as a social service than as a normally functioning business. There comes a point where you just say, "I cannot do this anymore."' Record shops are not just shops; they are the focal point of the whole community, especially if they have been there for generations. Selectadisc was not any ordinary shop; it was an institution that the people of Nottingham visited for years, exploring its wonderful world of musical delights. I like to think that through my generosity I aided in supporting it over the years during its financial struggles by spending hundreds of pounds there each year. Now it's gone; there's nowhere else to buy interesting music. Barton added, 'Ten years ago, the country had more than 1,000 independent music stores. Last year, there were 410. Now there are 305.' And that was back in 2009.

Way Ahead Records (c. 1987) and Reveal Records (c. late 1990s) in Derby.

Most of the independent record shops suffer in the same way as they have no sustainability to fall back on like the major chains: if one shop in the chain is losing money the others will support it and so the costs are spread. But independent shops have nothing to fall back on except their faithful and loyal customers. One such was Way Ahead Records in Derby. It was my favourite haunt every

Saturday morning, always a pleasure to walk in there, wander around and see what had come in new that week, and Tom, the manager, was always a personable guy who respected his customers. Sadly, his shop had to be demolished to make way for a new shopping centre. Way Ahead Records moved to another location, just up on the main road, and changed its name to Reveal Records. 'Don't worry, Derby, we are still here. There will always be record shops like us,' Tom proudly declared. Little did he know then that within two years his new shop would be forced to close due to rising costs and poor sales. Again, I like to think I supported it by spending most of my wages there. The only outlet left for records and CDs in Derby was the local HMV which tended to stock more in the way of films/TV shows (DVDs/Blu-rays) than music (CDs/records). It was like walking into a Tesco supermarket rather than a shop run by fans of music who knew their stuff. It seemed independent shops could not keep up with the competition; everyone was either buying online or downloading music of their choice.

It's a surprising fact that the majority of music listeners aged between 16 to 24 actually think they shouldn't pay for music. They want to download and stream it for free. How can any independent shop survive if most of its potential customers have this attitude and are incapable of dealing with the biggest factor in the decline of their shops: people's shopping and listening habits were now changing.

BPM Records, Derby (c. 1990s).

There was also BPM round the corner near the bottom of Sadler Gate. I used to go in there quite regularly as they had some interesting 12 inches, most of them being electronica, dance, etc., but the occasional industrial record would crop up, and they would offload batches of them each month, real cheap. It is still going today, although the premises have moved to the Old Blacksmiths Yard, just off Sadler Gate.

The owner, Dave Hill, who has been in the business for over three decades, now specialises in second-hand records. In fact, he took a load off me when I was moving and gave me a good price for them. He is one of the few who has managed to keep up with today's habits by advertising his stock online.

Eddie Fisher and Mick Tarrant in Armadillo Records, Bournemouth, c. 1977-78.

It was a far different matter when I was a kid, when there was no such thing as home computers or the internet. In Bournemouth, where I grew up, I remember there being a plethora of record shops, like Armadillo Records, on the corner of Queens Road and Norwich Avenue West, Westbourne, about 15 minutes' walk from Bournemouth's town centre. It was run by the affable Mick Tarrant. He specialised in a lot of imported stuff, mainly from America, that you didn't see in other shops, like the B52s' *Rock Lobster*, Corpse Grinders' *Rites for Whites*, Crime's *Hot Wire my Heart* or their *Murder by Guitar*; all these US 7-inch singles had the centre hole missing. You had to use a plastic adaptor to be able to play them. He also sold home grown records, mainly the independent labels like Beggars Banquet, Small Wonder, Crass Records, etc., and I got most of my punk singles from there, like Gang of Four's *Damaged Goods*, Television Personalities' *Where's Bill Gundy Now?*, Swell Maps' *Read about Seymour*, Dave Goodman's *Justifiable Homicide*, The Surgeons' *Sid Never Did It*, etc., all of which he obtained from the Rough Trade record shop in London. Apparently, he used to drive up there every Friday and pick up stuff that wasn't available anywhere else in Dorset. Sadly, after many years in business the shop closed. A great shame. I still have fond memories of being in the shop, glancing at all the interesting pictures on the walls, like the one of Siouxsie Sioux from a front-page tabloid after her appearance on the infamous Bill Grundy Show with the Sex Pistols.

Further up on Poole Road, heading into Westbourne itself, was Bus Stop Discs, so-called—yes, you guessed it—because it was situated next to a bus stop. It was run by the gentlemanly John Kremer who always looked dapper in his suit, and his colleague (can't remember his name now) who always wore denim and looked like he had just stepped out of Status Quo. They bought and sold LPs by the ton every week and must have had a couple of thousand in stock at any one time. You could pick up a single album in reasonable condition for £1.95. A double, I think, cost £3.50. It was a great place to pick up any records you may have missed out on. And if you were transitioning, moving from one genre to another, it was a handy place to offload all those records you didn't play anymore, getting a quid for each one, then splashing out on some others you were keen to add to your collection. If you didn't have enough money, they would put the records in a brown paper bag, write your name on it and you could go back the following week to pick them up. That's what I call friendly customer service. Sadly, it too has gone now.

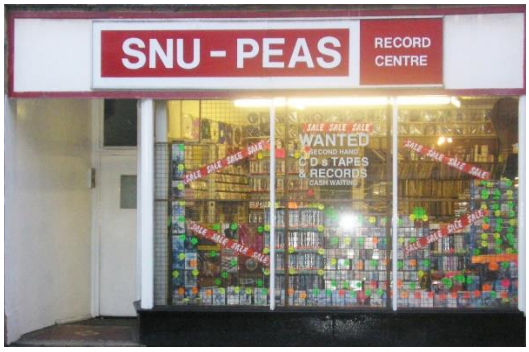
An original Uptown Records shopping bag from the early Eighties.

Heading into Bournemouth, I used to stop off at Uptown Records, 99 Commercial Road, part of the Triangle complex, and buy the latest popular punk singles, making sure they were on coloured vinyl, like X-Ray Spex, *The Day the World Turned Dayglo*, on bright orange vinyl, The Members, *Sound of the Suburbs*, on clear vinyl in a television picture sleeve, The Skids, *Sweet Suburbia*, on white vinyl with a special gimmick—never did work out what that was, The Police, *Can't Stand Losing You*, on blue vinyl, or Devo's *Come Back Jonee*, on grey-silver vinyl with a cut-out head you stuck on the cover. An hour later I would walk out of there with one of their carrier bags bulging with goodies. This too has also sadly gone. Yes, things have changed.

In the town centre were Our Price Records (remember them?) on Old Christchurch Road, a bit further up was Subterranean Records (which didn't last long), and not far from it another record shop whose name escapes me. Unfortunately, all of these have gone now, replaced by HMV in the shopping complex on Commercial Road.

At the bottom of Richmond Hill, right next to the square, was a small record stall which had a surprisingly large amount of old punk records. They were selling 45's like The Drones' *Temptations of a White Collar Worker*, other bands like Suburban Studs, Leighton Buzzards, Sham 69, etc., all quite cheap, at about 40 or 50 pence. I always got on well with the guy who ran the stall. If I discovered a single there which I didn't have, and could not afford, he would kindly put it by for me to pick up the next week when I got my pocket money.

We mustn't also forget Woolworths, W.H. Smiths, and other major chains that sold all the latest singles in the charts. I was delighted, but ultimately dismayed, to find my local Woolies were selling Siouxsie and the Banshees' *Hong Kong Garden* for 75 pence, rather than the standard 49 pence, all because it was in a gatefold sleeve. I didn't have enough money on me, went home, somehow managed to borrow 25p, went back an hour later only to discover they had all sold out. Gutted, I had to settle for the normal picture sleeve instead when it came back in the week after.



Snu-Peas, 10 Ashley Road, Boscombe.

If you wanted to check out some second-hand stock, there was always Snu-Peas, on Ashley Road in Boscombe, which is surprisingly still there. As someone described it: ‘Small shop crammed with massive selection of second-hand vinyl and cassettes. A crate diggers paradise.’ Exactly. I found many treasures there over the years. (Check out Will Snupeas on Facebook for more info.)

There were other second-hand shops, like Exchange and Mart, that not only sold records, but also goods, like toasters, binoculars, etc. All these shops were part of my growing up experience, witnesses to my love of music, and my eagerness to explore other tapestries and layers of sound. A pity most of them have disappeared over the decades. What we need now is to reinvigorate the market, to get record shops busy again, and that can only be done by introducing a new musical system that will help to revive many flagging stores.

A Brief Biography of an Audiophile

I love music and have loved it ever since I was a kid. Yet I would not become what I describe as an ‘audiophile’ until many years later, when I was able to distinguish between good quality from poor quality sound. The audiophile is a perfectionist, always in search of the perfect sound, or

rather the reproduction of perfect sound. He wants to hear music perfectly reproduced, each note, each chord, each drumbeat, each vocal intonation, without muffling or distortion so that it is no longer subdued, buried under poor-quality equipment of reproduction (i.e. turntable, amp, speakers, etc.) but brought to the fore in its full glory. This can only come about through a steep learning curve based on listening experience. It is all very well to hear music, but how many of us actually listen to it; by that I mean with full brain and attentiveness? This is what the audiophile seeks to do, listening to the sound, always looking out for something not quite right, as one would stare at a mirror looking for any smudge, blemish, or imperfection. The perfect sound is a perfect mirror: clean, precise, and polished, with no extraneous matter.

My introduction to hearing music was first through the radio (my mother had it on constantly) when I was a child living in Africa. Around this time, The Beatles, The Rolling Stones, The Kinks, etc., were very popular, also the songs of Burt Bacharach/Hal David, my favourites at the time being *Walk on By*, *Do You Know the Way to San Jose*, *Always Something There to Remind Me*, *Anyone Who Had a Heart*, *I'll Say a Little Prayer*, etc., all sung by Dionne Warwick who had a great voice, and others, or what we today would call 'Easy Listening' music. There were obviously the popular music shows on television, but nothing like Top of the Pops. I would not get into that until later when I came to the UK.

A Dansette Major, c. 1960's.

For my own listening pleasure as a kid, I was given a Dansette. This was a portable record player in a case with built-in speakers and a lid that was secured by latches to protect the record deck. Some Dansettes also had carrying handles. It could play singles and LPs and had three speeds; 16⅔ rpm, 33⅓ rpm and 45 rpm, and was great for carrying to parties and playing your favourite records. We would sit round it on the floor and sing along to the songs coming through the tinny

speakers. My one had a BSR autochanger which had the ability to play stacks of records in succession: you could put 5 records on the spindle, and it would play each one in turn successively. The single dropped on the turntable, the arm came out automatically, the stylus hit the grooves and we would watch in fascination as it moved inwards towards the centre of the record whist listening, enraptured by the sound. After the record finished, the arm would retreat allowing the next record to drop on top of the previous one. This did not do much good for your records as they often got scratched in the process, but it was a great way of listening to music, and so convenient.

We would listen to all the latest shows and soundtracks, or whatever was popular at the time. I distinctly remember having the soundtrack to *Oliver!* My sister had *The Sound of Music*. There was also *Mary Poppins*, *Bedknobs and Broomsticks*, *Chitty Chitty Bang Bang*, etc. We had 7-inch singles encased in little books, like *Dumbo*, *Pinocchio*, *The Jungle Book*, etc., so you could read through the lyrics and story whilst listening to the music and singalong to the songs. Also, the popular TV theme tunes came out on 7-inch singles, like *Thunderbirds*, *Joe 90*, *Stingray*, *UFO*, *Batman*, etc., all of course I've now lost. I also remember a friend had some 7-inch singles in red vinyl. I'd never seen that before. They looked weird, more like pieces of plastic than real records.

Dansettes, like everything else, died out after their introduction in the 1950s due to emerging technology. Yet they are still fondly remembered as part of the listening experience of my childhood.

A Ferguson (Model 3362) Radiogram Sideboard, c. early 1970s.

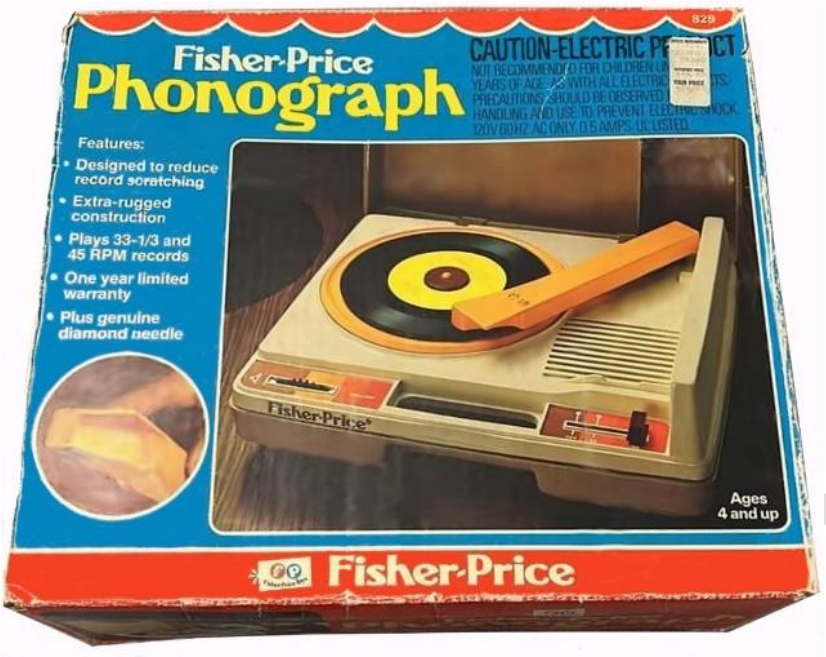
Much later when I was still a pre-teenager, and we moved to England, I would listen to my records using my mother's radiogram, a Ferguson, like the one above. As the name implies it was a combination of a radio and a gramophone. These were big, heavy pieces of furniture that took up most of your front room (it measured 120cm long x 58cm tall x 38cm deep). Like the Dansette, it had speakers built into the cabinet with a lid you could close when not playing records or listening to the radio. My mother often kept her potted plants on it when not in use. It also had a section in the middle of the cabinet for keeping your records, not many, probably just enough space to hold about 50 LPs at the most.

In America they were called consoles (see Illustrations for an example) and everyone seemed to have one back in the fifties and sixties, even up to the seventies when they were still quite popular. Due to their popularity at the time, the manufacturers of the radiogram added extra features like a record autochanger (as in the Dansette) which could accept six or seven records and play them in succession. The problem with these things was the sound was not particularly good and very limited. There was no bass or treble to adjust the sound, just a noise coming through the built-in speakers that sounded like it was coming from an offshore oil rig, not immediate or engaging.

Thanks to television shows like Top of the Pops, I got a lot of exposure to current music trends. My favourite genre at the time was Glam Rock. I loved its exuberance, its over-the-top-ness, its self-ridicule to the point of parody. Also, because it was fun, how music was supposed to be. Seeing Gary Glitter, The Glitter Band, Sweet, T. Rex, Mott the Hoople, Suzi Quatro, Alvin Stardust, Mud, even Sparks, although not all glam, was an exciting experience for a ten-year-old, and Keith Parker, my friend who lived two doors down from us who was slightly older than me, used to fascinate me by being able to sing along to all the songs. He knew the words off by heart. How? Because he bought the records each week and played them to death. It was a great time in the early seventies to be a kid, when there was so much happening musically, and almost impossible to keep up with. It was through shows like Top of the Pops you knew what was out there and what was happening. However, it did not include all genres as it only centred on the top selling records of each week.

There were other genres out there which people may not have been aware of, unless of course they read the music papers. This is something I did not do till I got to about 13 or 14 when I started following the punk movement. I hadn't heard of it until I read about it in the main papers after the Bill Grundy fiasco. The Sex Pistols had shocked the whole of London by swearing on live television. My mother the next day was disgusted. I loved it and that's how I got into punk. It got to the point where I had to have every singe that came out, some supposedly punk, though this was a moot point, somewhat arbitrary in many cases as any band that came along in the wake of the Pistols, or happened to be around at the same time as they were breaking through, were also being labelled with that moniker, regardless. I didn't care. It was new music, and to a young lad it was fun and exciting, something for the kids, not for adults or parents who couldn't relate to it. Mine were highly dismissive of it as a whole, seeing it as nothing but a phase I, as a kid, was going through, and that I would soon grow out if it, eventually. Perhaps they were right.

Yet it was the immediacy that got me hooked. It was happening there and then, and bands were putting out their own records, like the Desperate Bicycles, whose motto was: 'It was easy, it was cheap—go and do it!' Others followed suit, many not having great production values, admittedly.



A Fisher-Price Phonograph record player, c. 1978.

My friend, who lived across the road from us and was a bit younger than myself, was given one of these as a birthday present. Being slightly older and somewhat wiser, I was dismissive as Fisher-Price were renowned for making children's toys, not for manufacturing record players. But this thing did actually work. Quite remarkable. You select the speed on the right. The motor starts, the turntable spins and you rest the needle on the grooves. A horrible tinny sound is emitted from the in-built speaker on the right, and you adjust the volume using the slider on the left. We used to poke fun at him for having one of these, but he was always proud of it. Like all things vintage nowadays, this toy is a collectible item. Don't expect decent sound, though.

Records were originally recorded in mono as that was all technology at the time would allow, just a single channel. And it is an interesting fact that as I write this, the very first 45rpm 7-inch single, also in mono, was released this month, April 1949, exactly 75 years ago today. It was a Country and Western song on RCA Victor. Later, as technology developed, records came out in stereo, the radiogram was upgraded to a Stereogram specifically designed to play stereo records and enhance the music listening experience. At one point, sales of the radiogram were overtaking the fledgling television sales due to two things: the launch of FM radio and the introduction of the 45rpm single, as just mentioned.

However, towards the end of the sixties valve radio development was waning. Transistors started taking over, making radiograms obsolete as the possibility of reproducing sound could now be physically reduced in size. By the end of the following decade radiograms had been replaced by the music centre and after that the hi-fi.

Sharp Stereo Music Centre SG-22E.

My first music centre was a cheap affair, like the one above. It integrated three systems in one unit: a record deck, a tape deck and a radio (no CD player as CDs did not exist in 1980 and would not be developed or become available until 2 years later), with reasonable stereo sound coming through the two separate speakers I mounted on my bedroom wall. It had a clear plastic lid which you lifted up to play records, and had a tiny compartment for storing cassette tapes, and a wire antenna that came out of the back which you had to stick to the wall so you could get decent reception. It was all part of growing up in the early 1980s when music centres were the staple of every kid's bedroom.

All my friends had music centres. Every night we took it in turns to visit each other's houses so we could hear what new records our friends had just bought, sometimes dropping off a blank tape so we could get a copy (it was very easy to record an album using the integrated tape deck).

The problem was, due to the size of the lid it was quite heavy. You had to be careful putting the lid down when the record started playing. If it came down too hard, it made the stylus jump. Needless to say, this did not do your records much good. The lid was best kept closed at all times to prevent dust getting in and covering your records. Due to laziness, I tended to leave my lid up and was often surprised how much dust had accumulated on some of my records, with inevitably the stylus also getting covered in fluff. Too much fluff would send the stylus veering over to the middle of the LP making us laugh as it skipped over several tracks, producing a godawful sound, similar to an elongated cat's meow. You needed to keep your vinyl clean by wiping it down with a record cleaner, and also keep the stylus free from dust by brushing it with a small brush dipped in cleaning fluid, made specifically for that purpose. This was all part of listening to music as a teenager.

A Sharp Stereo Music Centre, c. 1985.

When I got older and had a job, thus earning a wage, I in invested in one of these, a more expensive Sharp music centre that had a built-in graphic equaliser, which did not impress me much. Also note the silver arm at the back. This was designed to be placed on the record as it spun. It had a little brush to keep the record clean and free from dust. Not that it really worked.

A year or so later, I was greatly influenced by the film *9½ Weeks* (1986, dir. Adrian Lyne), with its impressive soundtrack that sold better in the US than the film. The soundtrack boasted top-notch production and a good array of musical talent at the time, like John Taylor (taking a break from Duran Duran) who came out with the hit single *I Do What I Do*. Also featured were Luba, Lisa Dalbello, Corey Hart, Devo, Eurythmics, Bryan Ferry (his great single *Slave to Love*), and of course Joe Cocker's *You Can Leave Your Hat On*. I was so impressed by what I heard, I went out the next day and bought the soundtrack, as well as some of the artistes' albums as well.

This was at a time when there were few restrictions; you could sit in a cinema and smoke cigarettes without worry or complaints. I was so relaxed watching the film, I was practically in a trance most of the time, all helped by the great soundtrack coming through perfect speakers in the auditorium. I also loved Mickey Rourke's hi-fi system in that film and wanted my own version. Basically, I knew what I had at present was not up to scratch and I wanted to improve upon it, get a better quality of reproduction by upgrading not only the equipment but also the records as well. I went out and concentrated on buying LPs that had good production values. Foolishly, I rejected Nirvana's first LP, *Bleach*, three years later simply because on the back it stated it only cost $600 to make. Well, that was anathema to what I was looking for: I wanted high production values, superb stereo, with the equipment to match.

A mid-range Technics system with turntable and separates, including a CD player.

Of course, I couldn't afford anything close to Rourke's system, yet I graduated to something that suited me fine and fitted my budget. It included a pair of Acoustic Research speakers and a Technics turntable with matching separates, like the above. Alas, no CD player—that wasn't within my budget. Besides, I preferred the warm sound of vinyl, compared with the cold, clinical sound of CDs. There was another reason I bought Technics. I was told they were the best, but even so I wasn't assured; it always felt improvements could be made somewhere along the line.

The beauty of hi-fi systems is that you can keep changing parts of the system if you're not too happy with the sound. A hi-fi enthusiast is always looking to perfect the recorded sound in order to maximise sound accuracy with minimal distortion. Source is everything. Once the source is perfect then the component parts should be able to reproduce the sound as near as possible to the intention of the record producer/engineer. In fact, the sound should be identical to the Master Tapes. When this accuracy has been achieved you should be able to hear the guitarist running his fingers over the frets of his instrument without having to turn up the volume. Audiophile systems were designed for this purpose and to prioritise high-quality music formats, like CDs, using specialised equipment, as in premium turntables and CD players, and digital to analogue converters, and other high-end devices, with many audiophiles like me preferring the unique sound characteristics of vinyl records and vacuum tubes.

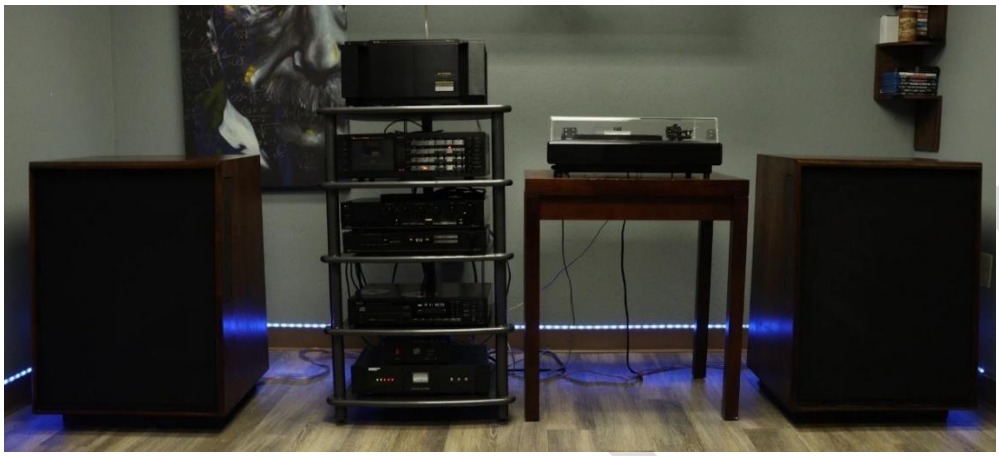
A Sony stack system, including a Dat player, a tape deck, a CD player, a MiniDisc player, a tuner, and integrated amp. Note the turntable is on a plinth which is attached to the wall to minimise vibration.

It took me a long time to convert to CDs. I did not think the sound of that format equated or came anywhere close to vinyl. I was still partial to the sound of the well-played groove, the occasional click of a scratch; it all added up to the overall effect of the listening experience.

A stylus, part of the cartridge attached to the tonearm of the turntable, is the essential part of the apparatus as it is this that picks up the information from the grooves and conveys it to the amp as sound.

However, I was forced to convert in the Nineties when the stylus for my turntable needed to be replaced, a new one being prohibitively expensive. I joked with the stockist, when he told me the price, how I only wanted a new stylus, not the whole bloody turntable! I became a late convert for that reason; you don't have to keep replacing a stylus when playing CDs. However, it is not the same. Yet, for reasons of economy, also space, I had to adapt. You need plenty of room to stash

over 2,000 LPs. That in itself can be something of a headache, especially when it comes to moving. CDs, as the name implies, are more compact in size taking up less space, but one is often tempted to replace all one's vinyl with copies in CD format, something I refrained from doing. Alas, record companies are not stupid: a new format means more opportunities to sell their back catalogues, preferably with extra tracks, making it more tempting for fans to buy.



Example of a home set-up, showing hi-fi separates on a shelving system, with a turntable on a separate table, again to minimise vibration, with speakers to either side for maximum stereo effect.

I only buy CDs, with the possible exception of a LP not available as a CD, or it may have something the latter does not offer, e.g. a foldout sleeve or poster, coloured vinyl (yes, they still do that these days), something you cannot get with a CD. Who's ever heard of a coloured CD?

Another example of a simple home set-up. Again, the hi-fi separates are on a shelving system, this time without a turntable, the speakers are to either side but should be much further apart.

A selection of four modern turntables. Note that the two on the left are belt driven (the belt is on the outside of the deck itself) and the two on the right are direct motor driven.

As an audiophile I was always in search of the perfect sound. My definition of 'perfect sound' is one that is neutral, that has no preference over any part of the sound, i.e. bass, treble, highs, lows, etc., and should give full expression to each nuance of sound so that the audio quality is a perfect reproduction of the original master tapes.

I will never forget one night, back in the late Eighties, when my local hi-fi store used to hold open evenings for their customers. It was a special invite for a demonstration, with the very best set-up, probably designed to get us to part with more cash by impressing us. On this evening, I took my girlfriend with me who wasn't into what she called 'Boys Toys' but came along to keep me company. It was a nice social event with only a few people present. That made it better as there was more room to breathe in the relatively small size room. The equipment was all set up. And the young guy in the suit, obviously a salesman, said he was now going to show us all how records should sound, and picked up a copy of *Kick* by INXS, their sixth studio album which had just been released that year.

He carefully pulled out the record, placed it on the platter, turned up the volume slightly and set the stylus down on the vinyl. Out blasted the opening guitar chords to *Need You Tonight*. Wow. It was amazing. I can honestly say everyone in the room, even my girlfriend, were all stunned. It was as if the band had stepped out of the speakers and were now in the room. It blew me away, and it was then I realised how powerful good music and good equipment could be. Yes, very impressive. I was converted on the spot. But it is all fine and dandy if you have the money to support an expensive 'hobby' like this. When he told us how much the equipment cost, our jaws dropped to the flaw; we all lost interest as it was for most of us a price that was simply out of our league.

I ended up not spending too much on my hi-fi system, probably only a couple of grand, but I know some guys who have spent several thousands, to the point where it becomes ridiculous, with one

friend of mine having an expensive power amp and a pre-amp combination that need to be turned on a half hour in advance to give them time to warm up! I settled for a Rotel CD player, a Mission Cyrus amp, a pair of Tannoy speakers, a Revolver turntable and a Denon tape deck (the latter two no longer used). See Illustrations section for these and many other examples. Incidentally, they are included to show the sheer diversity of musical equipment available. Feast your eyes on the audio equipment you could have, if, that is, you have the money and space.

Lastly, before we leave this section, we should make mention of one system that has not been discussed so far, and that is Sonos.

Sonos is the name of an American audio equipment manufacturer based in California. The company was founded in 2002 and it is partnered with over 100 companies offering music services, like the ones mentioned above. Its products work with voice assistants, like Amazon's Alexa, Google's Assistant, and Apple's Siri, although the last is only supported through Apple's Home app. The company provides a full range of products (see below), like speakers, amps, soundbars, etc., to beam music throughout the home; the devices are connected wirelessly, some are voice activated, so you can choose and listen to music wherever you are.

Here's some of the most significant products they have come up with so far:

The first was its Digital Music System consisting of two components, the ZonePlayer and the Controller (or ZP100 and CR100, respectively); the unamplified ZonePlayer ZP80, with analog and digital input and output connections to link a user's Sonos system to their traditional amplifier; the ZonePlayer120 (ZP120, later CONNECT:AMP), which replaced the ZP100, and the Zone-Player90 (ZP90, later CONNECT), which replaced the ZP80; a free Controller app for the iPhone, iPod Touch, other IOS devices and for Android, so no need for their separate controllers; the CR200, a second handheld controller which replaced the CR100, with a touch screen rather than the CR100's scroll wheel; the ZonePlayer S5 (later PLAY:5), the first independent Sonos-connected amplified speaker; the Play:3, a second, smaller, amplified speaker in its Play lineup of smart speakers; the SUB wireless subwoofer; the PLAYBAR soundbar speaker; the Play:1, a third, compact, smart speaker; a limited edition Blue Note Play:1—a collaboration with Blue Note Records; a new (2nd gen) Play:5 speaker; the PLAYBASE, a soundbase to go under a television; the Sonos One, a small connected speaker with voice control (this is where they developed whole house systems collaborating with Amazon's Alexa as a third-party voice controller); the Sonos Beam, a soundbar with voice control; a new version of the Sonos Amp; a 2nd-gen Sonos One, with Bluetooth LE connectivity, a faster processor, and more memory; in conjunction with IKEA they developed a small bookshelf speaker and a combination table-lamp/speaker; a battery operated Sonos speaker called Move; a small battery operated Sonos speaker called Roam; the Sub Mini wireless subwoofer (in black or white); the ERA 100 and ERA 300 speakers.

Beam + Era speakers

Boost

Connect Amp

Five

One (2nd gen)

Play

Port Wi-Fi Streamer

I was first introduced to the Sonos system by my local hi-fi shop, Superfi, around 2005, not long after Sonos had started. The guy was trying to get me to buy the ZonePlayer and Controller, not before giving me a demonstration first. He asked me what my favourite band was. I replied, 'Foo Fighters' as they were very popular around then. He tapped the name into the controller, selected a track by the band and, hey presto, we had the Foo Fighters blasting out of their speakers. I was quite impressed, yet it seemed pointless to me. I was a bachelor living in bachelor pad. I didn't need Sonos. All I had to do was go over to my hi-fi, turn it on, select a Foo Fighters' CD and slip it in the player. Hey presto, I had the Foo Fighters blasting out of my speakers. 'Ah, but this is for the whole house,' he countered. 'You can have music in any room of your choice, as long as you have a speaker in the room.' I was still not impressed although I liked the idea. It would be okay for a family living in a large house, but for me living in a flat by myself that only had three rooms, it seemed like an unnecessary expense. I thanked him for the demonstration and walked out. I soon forgot about Sonos, and the convenience of having music at your fingertips (or now at your lips since the equipment is voice activated) as it was the same as streaming, and I think back then you had to pay for a subscription service. As I have said, I would rather have the product, something to hold, than a digital, streamed copy. But for those who are keen on the idea of having this type of music system, it is worth bearing in mind.

Part Two: Proposal

Two women, circa 1950's, smoking and listening to records on a gramophone—my, how times have changed!

Do we need another audio system?

Yes, we do. If, going by what has already been written, and what is to follow, you will see the justification for this assertion, and hopefully believe by the end of this paper that indeed my assertion is correct. We need another system that is compact without making any allowances on the quality of sound. It is called the Rack System.

The Benefits of the Rack System

Wouldn't it be great if we could supplant all these hard copy music formats by buying the same albums in compact form which take up less space, and weighed less, as well as have the convenience of being able to locate the album you're desirous of playing amongst all the hundreds in your collection. And it beats the dreaded alternative of refraining from buying music altogether, which for me would be unthinkable.

Well, the Rack System has been designed specifically for this reason, to save on space and make the listening experience much more enjoyable and entertaining, as well as convenient.

In a way it is reminiscent of the old jukeboxes where you inserted your money, selected the single you wanted to hear, pressed 'play', and watched the selector pick up the record and start playing it. In our system, there's no need to take the record out of its sleeve, to place it on a turntable, then

line up the stylus with the start of the track you wish to hear. There's no need to take the CD from its case either, which can be awkward and cumbersome at times, and place it on the tray, then waiting for the tray to retreat into the CD player, and wait for the player to read the CD, before you can finally listen to it. We negate all these laborious steps by making the music available, here and now, in an easy format, whilst still retaining the appeal of actually going out and buying the new album by your favourite band and having the pleasure of owning it rather than downloading a digital copy, which is never physical, never the same as possessing it.

If you really appreciate music, and like me prefer good audio quality that is down to the producer/engineer in the studio, and the recording, with the precision of the music publisher/production company, who will endeavour to release it to the utmost spec so you can enjoy the music at its best quality, and in the pleasure of your own home, then inevitably you will understand why all previous formats will soon become obsolete. Nor is there any need for compression. In fact, the original recording as a data or FLAC file can be transferred straight over to the product which is about a sixth of the size of a CD in its case. Think how much space that will save once you have converted to this new format and stored all your old records and CDs in boxes, stashing them in the attic/cellar where they belong.

Admittedly, the initial outlay will be expensive, but this is no different from buying a turntable and amplifier and a pair of speakers. Some of the best turntables, for example, can reach up to ridiculous amounts, like the Linn Sondek LP12, Pro-Ject 10, etc. (See Illustrations.) The same can be said of a CD player. Popular brands like Toshiba, Kenwood, Sony, Hitachi, etc., are relatively inexpensive as they tend to cater to the average music listener. But there are some players which are for the top end of the market and way beyond most people's budget. It is important to realise the audio quality reproduction is only as good as the source. If you have a cheap turntable with a not very good stylus/cartridge, then do not expect much from your favourite LP. By upgrading to a better turntable and stylus, the quality of the audio can be considerably improved.

The same can be said for the CD player: you want one that mirrors perfectly the sound captured on the disc. Then there is the other consideration, a good amp which is designed to amplify the sound and can only amplify *what is already there*, and a decent pair of speakers to reproduce that sound with the correct level of bass and treble. When combining these elements as separates in a hi-fi system, the outlay can mount up. It is also a matter of getting the combination right, more to your own individual taste, so you end up with a sound you want, something neutral being preferable that does not extend the bass or up the treble, as previously explained.

<u>The Rack System</u>

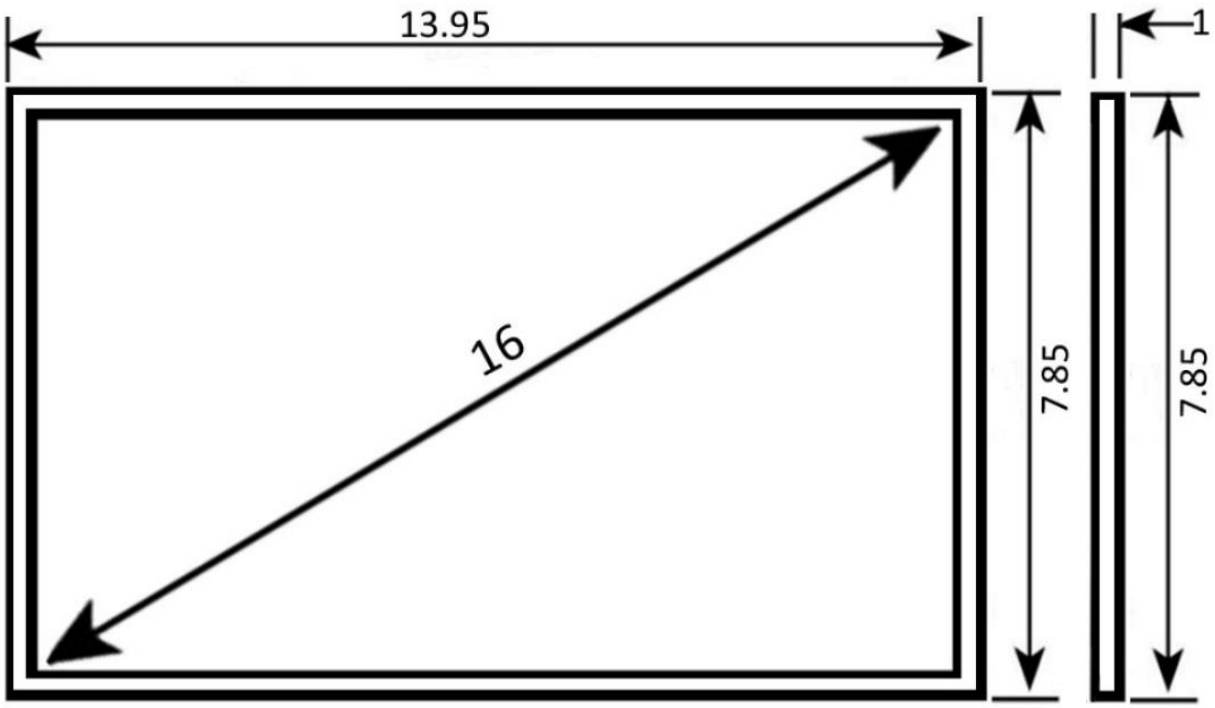
With the Rack System there are three parts of hardware: the player, the speakers, and the racks. Then there is the medium itself, the sticks. We will discuss each in turn.

Audio Players

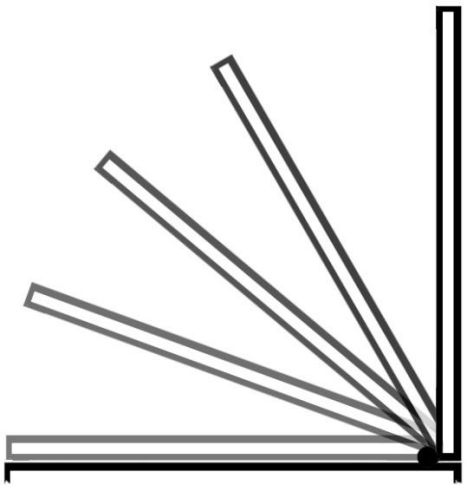
Probably the most expensive part of the Rack System will be the Audio Player. This can vary in size and spec, depending on what the customer is looking for in his system. Most Audio Players will comprise the basic standards of an amplifier, a small hard drive, a screen, and a sensor for the remote control. Like the Racks, the player comes in two colours: black or white.

There are two types of Audio Player: the integrated and the separate (the latter compatible with hi-fi systems without amp/volume control/speaker connectors, only AV connector to attach to an amplifier and is the most basic model).

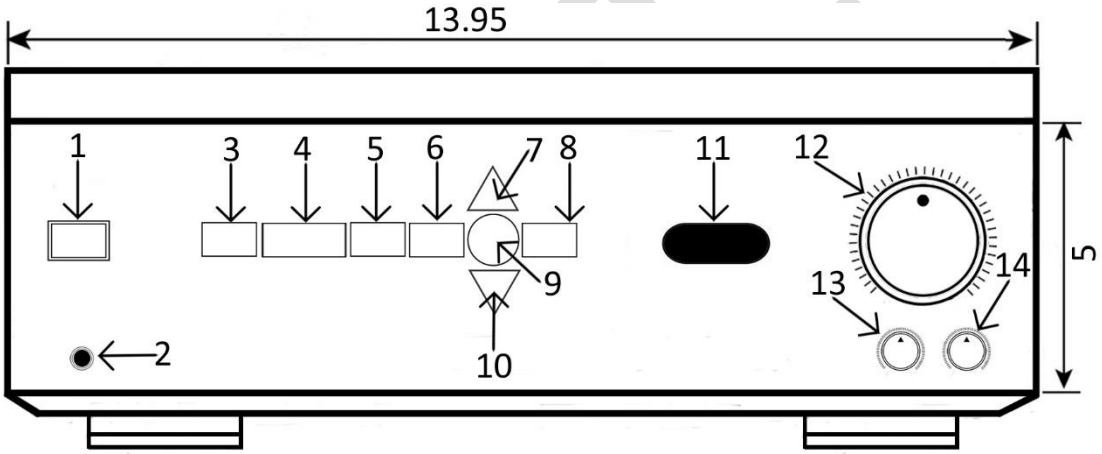
The Audio Player is a rectangular-shaped box with a fitted screen. The latter lies flat and swivels up vertically. It can be adjusted so it is fully perpendicular to the unit, allowing visibility from the comfort of your armchair. It is a 16-inch, OLED screen with a resolution of 1080p, and aspect ratio of 16:9, with a good display and refresh rate. The screen must be crystal clear and sharp as it is quite small. Its dimensions are 13.95” x 7.85” and 1” thick (in the frame). It is the same size approximately as the average laptop screen. There are no controls on it; it is not a touchscreen.



Front and side views of screen of Audio Player showing dimensions.



Side view of top of Audio Player showing screen in various stages of elevation.
Note the hinge embedded in the back of the screen making it perfectly upright, and when closed, i.e. lying flat, the screen will coincide with the top of the Audio Player.

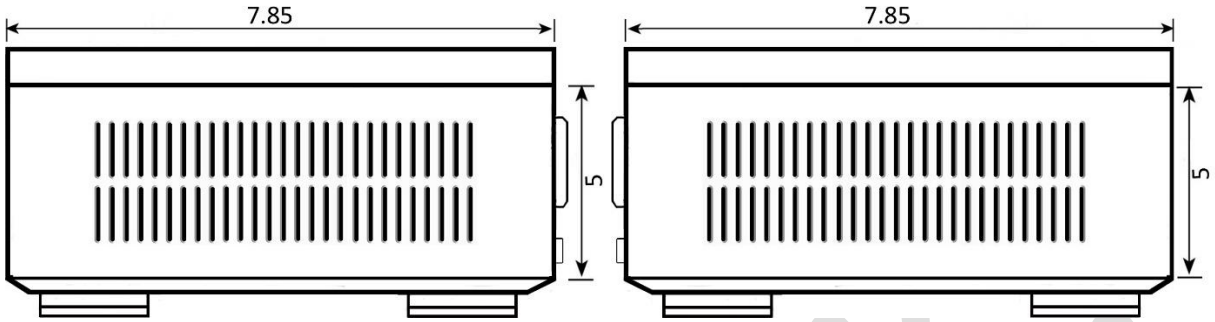


Front view of Audio Player showing dimensions and parts.
1 = Power, 2 = Phones jack, 3 = Pause, 4 = Play, 5 = Stop, 6 = Back, 7 = Up, 8 = Next, 9 = OK, 10 = Down, 11 = Remote sensor, 12 = Volume, 13 = Bass, 14 = Balance.

On the front panel is the power switch (the player will always be in standby mode unless the power is turned off). Next to that are the following buttons: pause, play, stop, back, up, down, OK, next. Next to these is the sensor panel for the remote control. On the far right, the large knob is the volume control. (Volume levels will be displayed on the screen.) On the far left is the phones jack, on the far right, a balance control for the speakers and a bass controller for the subwoofer.

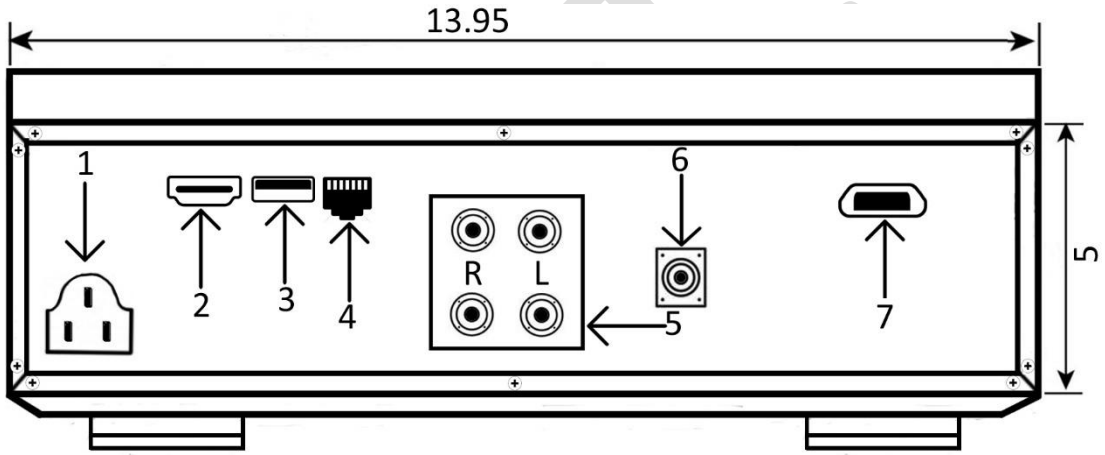
The same buttons on the front of the unit will be found on the remote control for ease of use. There is an additional button on the remote control which we call a ‘Speak’ button, and is heavily indented, rough to the touch. This is for blind and sight impaired people to use. Upon pressing this button, the Audio Player will announce the band, album, and track title of the audio stick about to

be played. The voice will come through the speakers and immediately drop out once the track starts.



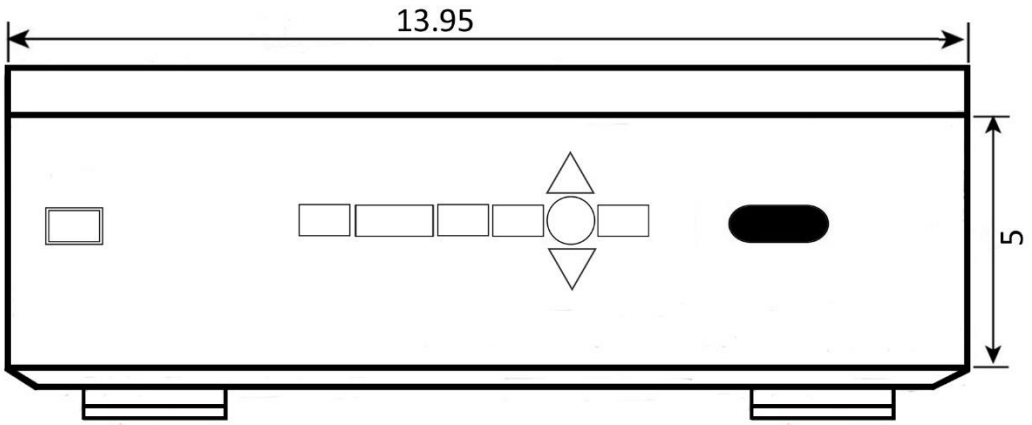
Two side views of the Audio Player, the left-hand and right-hand, showing both have ventilation grills as the player is more like a computer and needs a good air supply to prevent it from over-heating.

On either side of the unit are grills to allow for ventilation (as above).

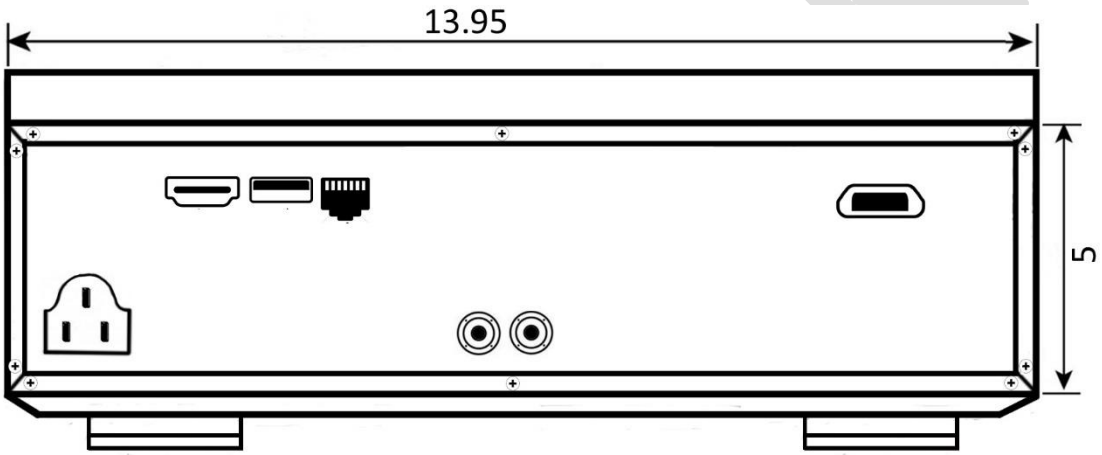


View of back panel of Audio Player showing sockets, etc.
1 = Power, 2 = HDMI, 3 =USB, 4 = Ethernet, 5 = Speakers, 6= Subwoofer, 7 = Rack connector.

The back panel has a power socket, left and right speaker sockets, a subwoofer socket, a USB socket for copying data files for back-up of the device, and to download and install the latest drivers, an Ethernet socket so the unit can be connected to the internet allowing for software upgrades and additional information like time and date, and a HDMI socket for connection to an external screen (ideal for karaoke as most Audio Sticks will have embedded lyrics), and the connector for the rack. It is through the latter all the info from the racks is passed to the player. An additional option will be another set of connectors so two more speakers can be connected to get a quadrophonic, surround sound.



View of front panel of basic model, showing lack of volume control, bass, and phones jack.



View of back panel of basic model, showing connectors for an amp.

The fixed screen will display the following: cover art and other artwork, liner notes, music credits, time/date (if connected to internet), music videos, track listing (with length of track), track history, a progress bar, volume levels, lyrics of songs (if available), search function, and other options (possibly a mixing desk so adjustments can be made to the sound or to isolate or knockout the vocal track, etc.).

As a working scenario we will look at some of the information that can be displayed on the screen. By clicking on 'Track History' it will be possible to see how many times a track has been played, even giving the date and time it was last listened to (if the player is connected to the internet). This can be helpful when trying to identify a song. Say, for example, you were listening to a track you really liked last night but cannot remember who it was by or what it was called; it will be possible to scroll through all the tracks that were played the previous night and locate the track (band name, album and track title will be displayed, alongside the rack listing, e.g. A26—see below). Then it is just a matter of playing that track again to check if it is the one you were thinking of. Locate A26 on the rack, press the Audio Stick and skip to the desired track. (The Audio Stick must be on in order to play the track as the Audio Player does not keep a copy of the track, only the data

referring to it.) Or you might want to sing along to your favourite track. Simply press 'Lyrics' and the lyrics for that track will be displayed. (Note, lyrics are provided by the record companies; it is down to them whether the lyrics are included on the Audio Stick or not.) The Audio Stick maybe enhanced with music videos, band interviews, live concert footage, etc. All these can be displayed by skipping to the Extras folder (i.e. the second flash memory of the Audio Stick) and opening it.

These are just a few examples of the versatility of the audio player. As the evolution of the unit progresses to meet the customers' requirements, other features will be added to enhance the listening experience and make it more enjoyable.

Speakers

Speakers can be purchased separately. Speakers will be down to individual taste, based on what the customer is looking for, how much space he wishes them to take up, as well as the size of his budget. If the latter is minimal, then it will still not be a problem as audio sticks contain the best quality recording possible, so even a cheap pair of speakers will be capable of reproducing the sound adequately. Obviously, at the other end of the scale, an expensive pair of speakers (like the ones illustrated here, which we recommend) will be top-notch and therefore the most perfect you can get. For additional enhancement a subwoofer can be added to the system (it can be plugged into the subwoofer connector at the back of the Audio Player). This may be preferable for those who like a bit of extra depth and bass to their sound, like listening to reggae, for example, where not only do you want to hear the bassline, but you also want to feel it as well.

We recommend the Magnepan LRS+ speakers as they are tall and slim, in perfect keeping with the Rack System ethos by taking up little space and are aesthetically pleasing to look at. They also sound brilliant and are available in black or white. LRS stands for Little Ribbon Speaker:

> 'Ribbon and electrostatic speakers are elegant and simple. The air is moved, and sound waves are created by moving an ultra-light film or aluminium ribbon. Ultra-low mass enables the ribbon to respond quickly to the electrical signal from the amplifier. What you hear is higher definition.'

The specs are: Dimensions (in inches): 13 wide x 48 high x 1 deep.
Impedance: 4 Ohm, sensitivity is 86dB / 500Hz / 2.83v.
The price is $995.00 or £788.

There are also a pair of Maggie stands available at $299 or £236 (see below) which are essential steel stands for these speakers.

Magnepan LRS+ speakers (black) and the Maggie floor stands.

They offer a considerably more complete sonic picture. Alternatively, there is the Magnepan 3.7i which incorporates the ribbon tweeter along with quasi-ribbon bass and midrange drivers, with the same sensitivity and impedance as above, but slightly bigger, at 24 x 71 x 1.625 inches.

Magnepan 3.7i.

Or there is the Magnepan 30.7, a giant, four-panel (two panels per side), four-way, ribbon/quasi-ribbon line source floor-standing speakers. As per the brochure: ‘With its highly coherent wave-launch, free standing imaging, vast soundstage, phenomenal resolution of inner detail, lightning

transient response, incomparable naturalness of timbre, and total lack of box coloration and diffraction, it is markedly less “there” as a sound source (and markedly more lifelike on voice and acoustic instruments) than almost every dynamic-speaker-in-a-box.’ The price: $37,995.

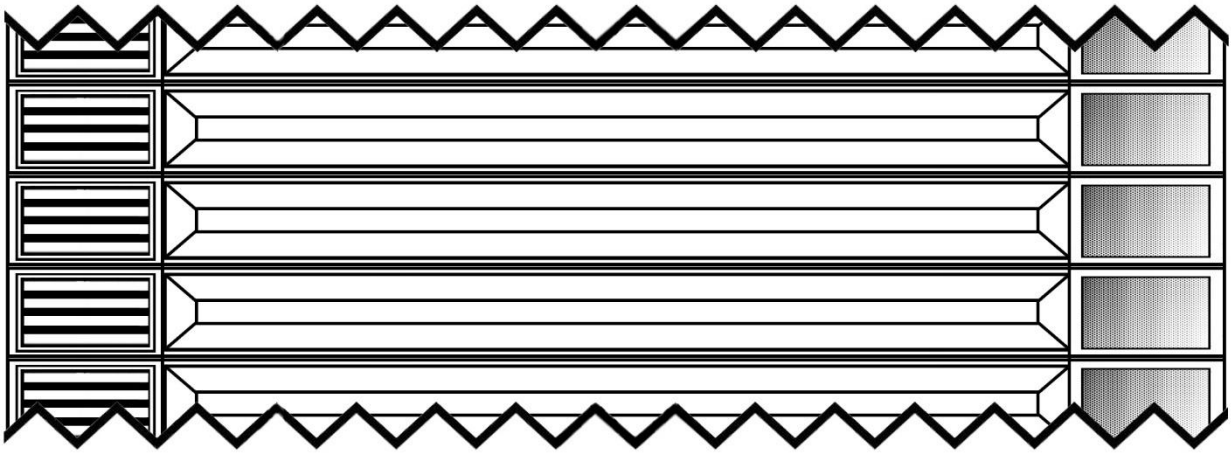
Magnepan 30.7.

Lastly, there is the Magnepan 1.7i, which has been described as ‘tall, skinny, three-way, full range, quasi-ribbon, dipole floor-standing loudspeakers. High in resolution, low in distortion, with enough bass and treble to satisfy any audiophile, and a midrange that reproduces well-recorded voices and acoustic instruments with jaw-dropping realism.’ Dim: 19 x 65 x 2 inches.

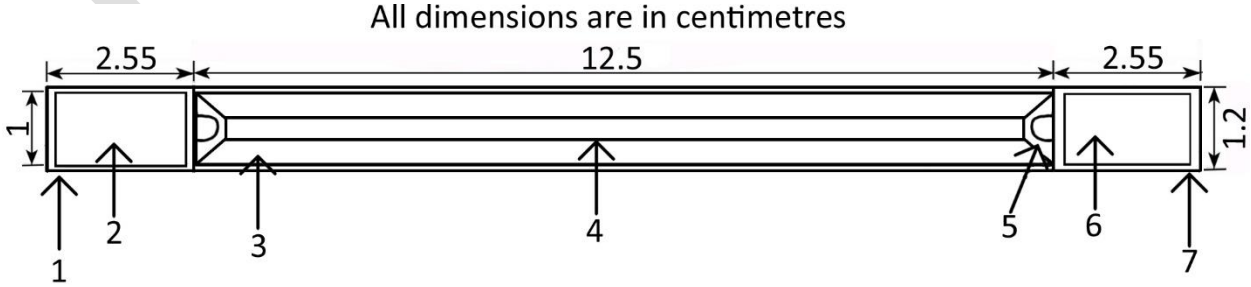
Magnepan 1.7i.

Racks

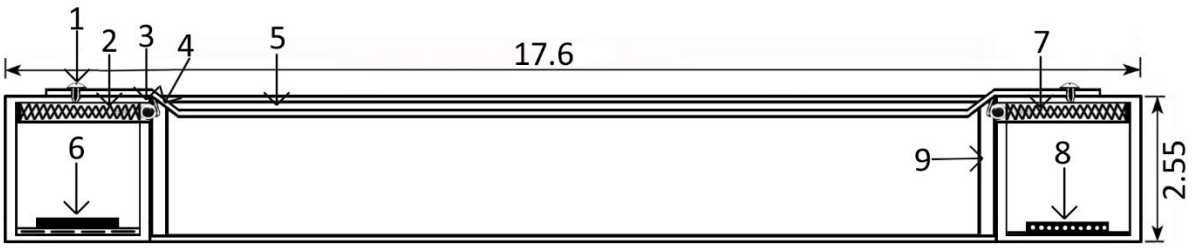
The Racks can be purchased individually. The first that needs to be bought is the Primary Rack (without it the Audio Player will not work). This is a metal frame that consists of two upright arms attached to the bottom solid part which sits on the floor and is called the Base Unit. The Base Unit is plugged into the mains for power. On the left- and right-hand side of the Base Unit is a socket for the cable that attaches to the player. It is up to individual preference which side is chosen, can be either, it makes no difference. For this example, we will say that the Rack is going to be on the right-hand side of the Audio Player, so the cable will be plugged into the left-hand side of the Base Unit. Between each arm of the rack is a clip-loaded slot for insertion of the Audio Sticks (see below). The upright arms differ slightly. The one on the left contains the sensors which are adjacent to each slot. These sensors connect with the head of the sticks and relay the information back to the player. The one on the right has a LED next to the slot. This lights up when the stick is in play. Circuits are embedded in both arms. These circuits relay the information to the Base Unit where it is passed on to the player. At the back of the rack is a metal clip to hold the Audio Sticks in place (see below for more info).



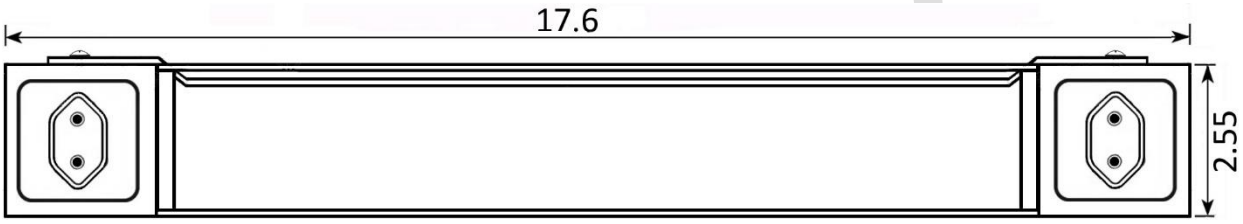
View of part of the Rack, from the front, showing sensors, slots, and LEDs.



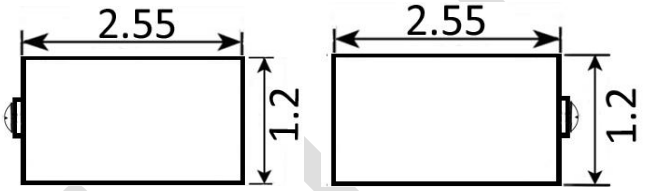
Front view of part of the Rack showing dimensions and parts.
1 = Left arm, 2 = Space for sensor, 3 = Slot, 4 = Metal clip,
5 = Metal tongue, 6 = Space for LEDs, 7 = Right arm.



Rack, top view, cutaway, showing internal components.
1 = Screw, 2 = Spring, 3 = Ball bearing, 4 = Metal tongue, 5 = Metal clip, 6 = Sensor/connector,
7 = Spring chamber, 8 = LED/connector, 9 = Runner.

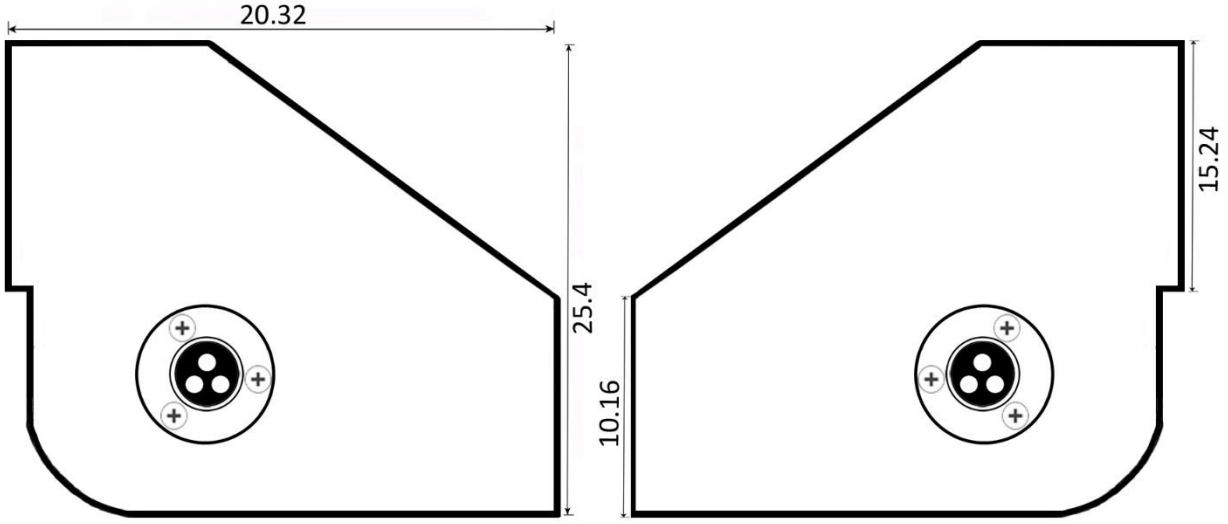


View of top of the Rack showing sockets in both left and right arms for connecting another set of racks.

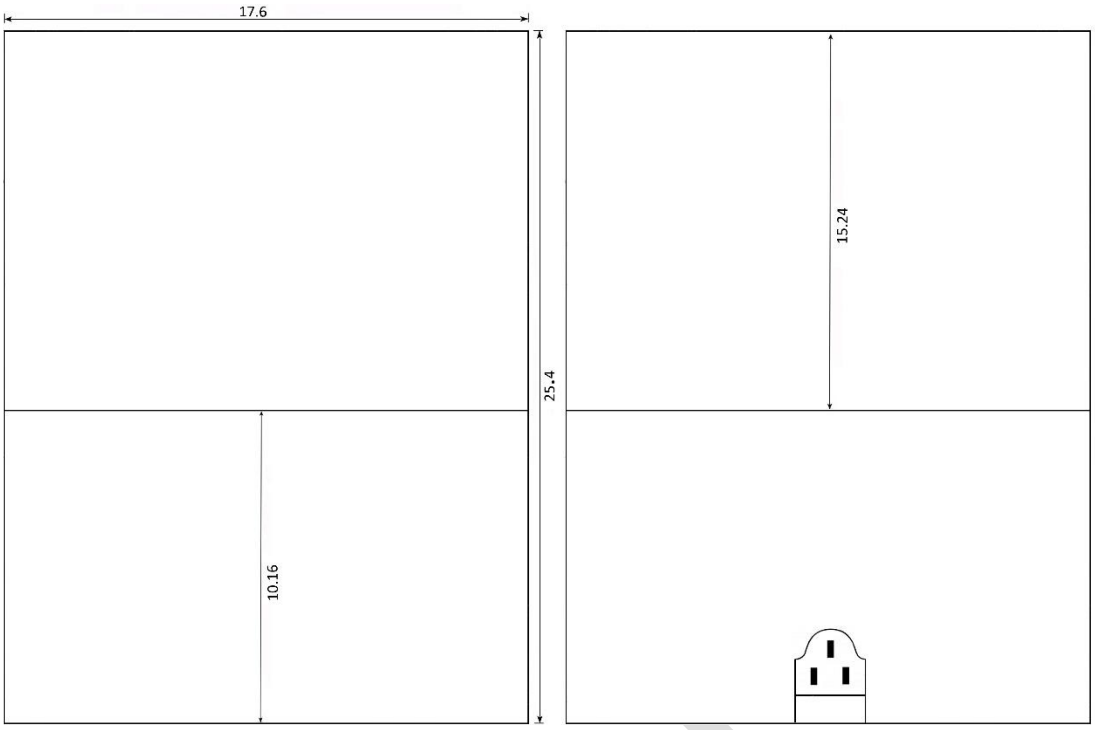


Views of sides of one section of the Rack, the left arm and the right arm.
Note the screw at the back for holding the metal clip in place.

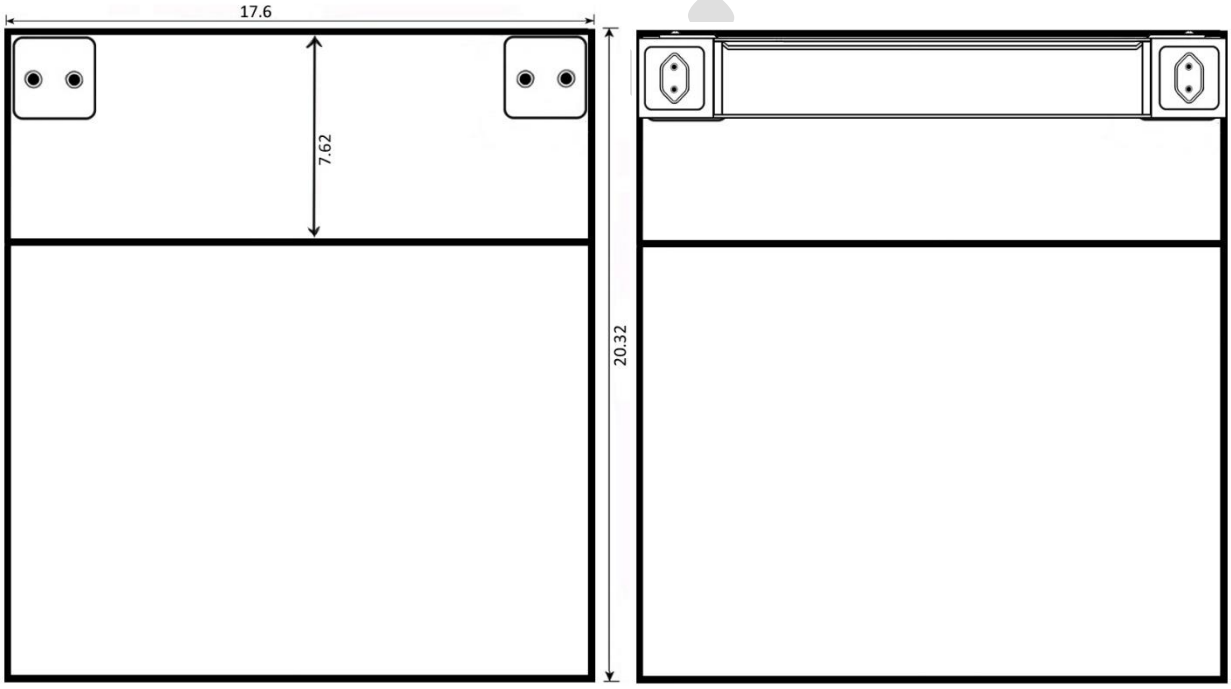
All dimensions are in centimetres



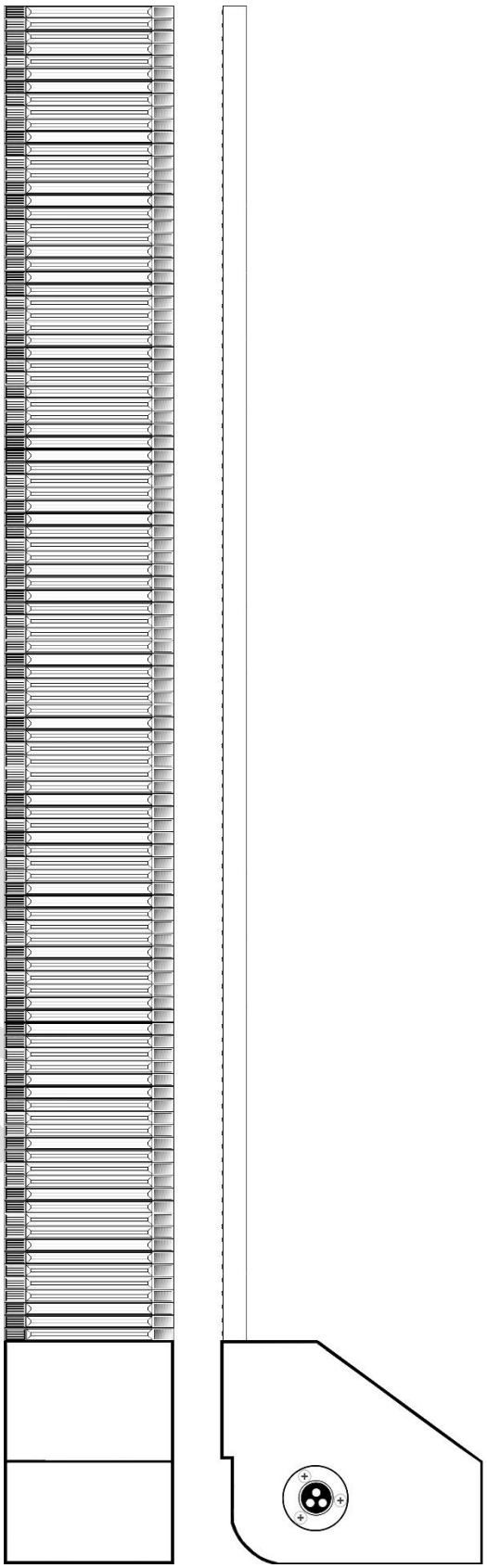
Side views of Base Unit, showing dimensions of left and right sides and their connectors.
Note, at the back there is an indent of 1 cm. This is to accommodate wainscoting so that
the unit can be flush up against the wall when it is sitting on the floor.



Views of front and back of Base Unit showing dimensions and the power socket at the back.
The latter is submerged 5cm into the unit so that it does not interfere with the wall/wainscoting.



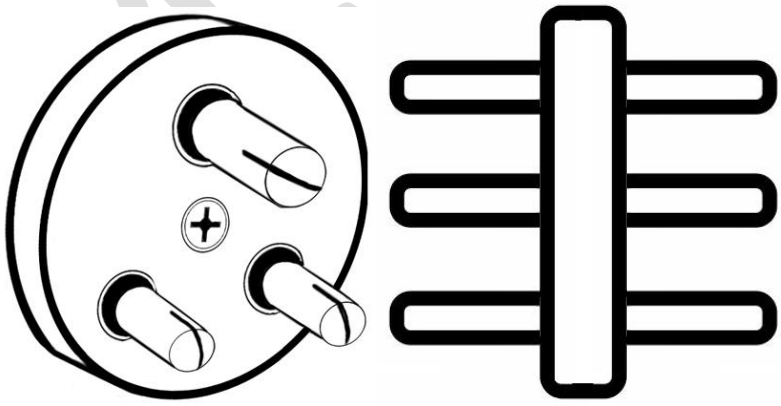
Two views, top, of Base Unit showing dimensions and the connectors for Rack, and with a Rack in place.



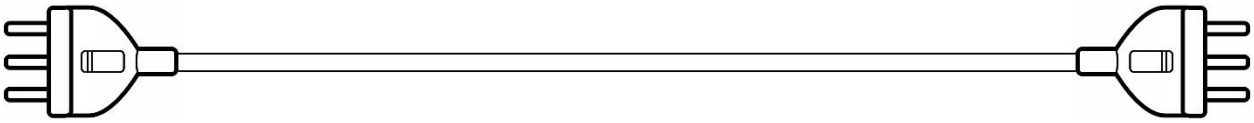
Two views of complete Rack: front and left side showing Base Unit + 100 slots (total height = 145.4cm).

Each Rack has 100 slots. They can hold up to 100 Audio Sticks. At the top of the Rack on each arm is a socket for an additional Rack which we call a Rack Xtra WBU (Without Base Unit, see below). This locks into place, with electrodes connecting to the circuits of the Rack below it, to feedback the information of this Rack to the Base Unit of the Primary Rack so it can be relayed to the player. This also contains 100 slots to house another 100 Audio Sticks. If preferable, a smaller rack can be purchased containing only 50 slots. This is called a Mini Rack Xtra WBU. Note that a Base Unit and Fixed Rack come to a height of 145 cm. This is about eye-level. Another hundred slots will take it well up to the ceiling, so someone will have to use a step-up ladder or stool in order to reach the sticks at the top. Therefore, it would be more conceivable to purchase only an additional 50 slots so that the higher ones remain within reach. (Note, though, the photo of Henry Rollins standing on a stool to reach his records on a high shelf, so it is not that inconceivable to have an additional 100 slots if the room has a high enough ceiling.)

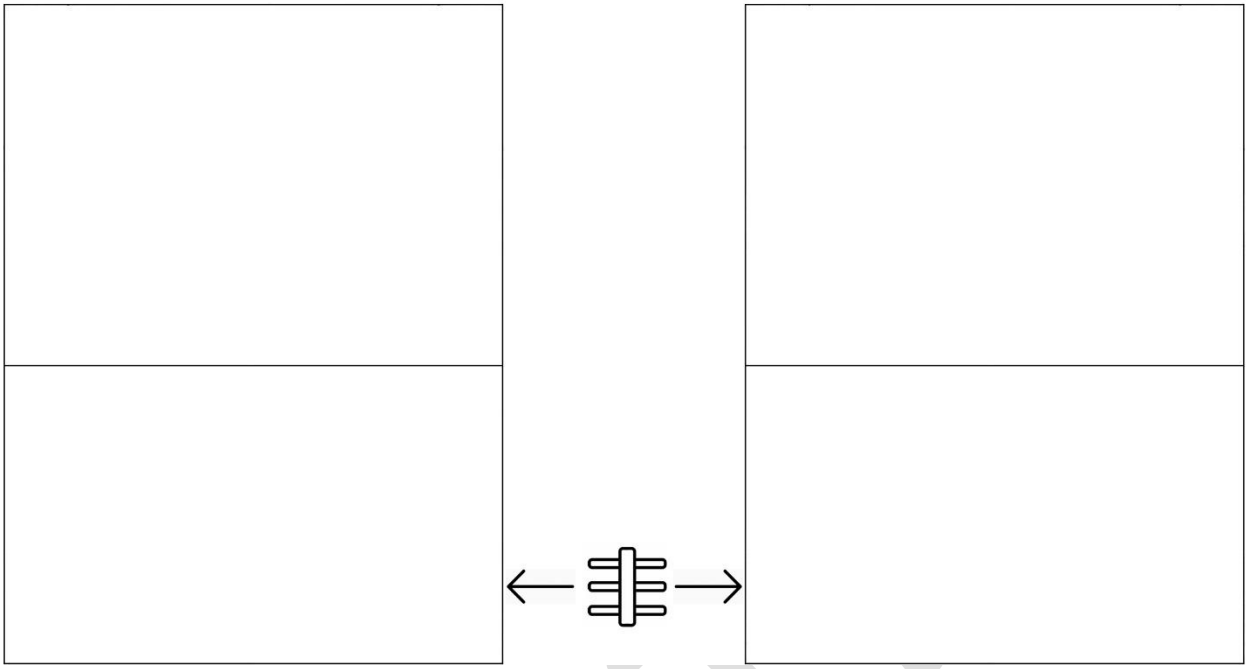
Both the Rack Xtra WBU and Mini Rack Xtra WBU contain sockets at the top for additional racks, so the racks can be extended as vertically as high as the room will allow. Note the Base Unit is heavy and sturdy, made of cast iron or similar heavy metal to counter the weight of the attached Rack and to minimise the possibility of the Rack falling or toppling over, unless done deliberately. We estimate it should weigh around 20 to 30 kilos. Any lighter, then the Rack is liable to topple over, unless pushed up against a wall for added support. The Base Unit has an indent of 1cm at the back so that it does not conflict with a skirting board or wainscoting. Also, the socket is fairly deep within the unit itself. This is so it does not interfere with the wall. The back edge is filleted to allow the power cable to run freely to the wall socket and to ensure the Base Unit sits flat on the floor.



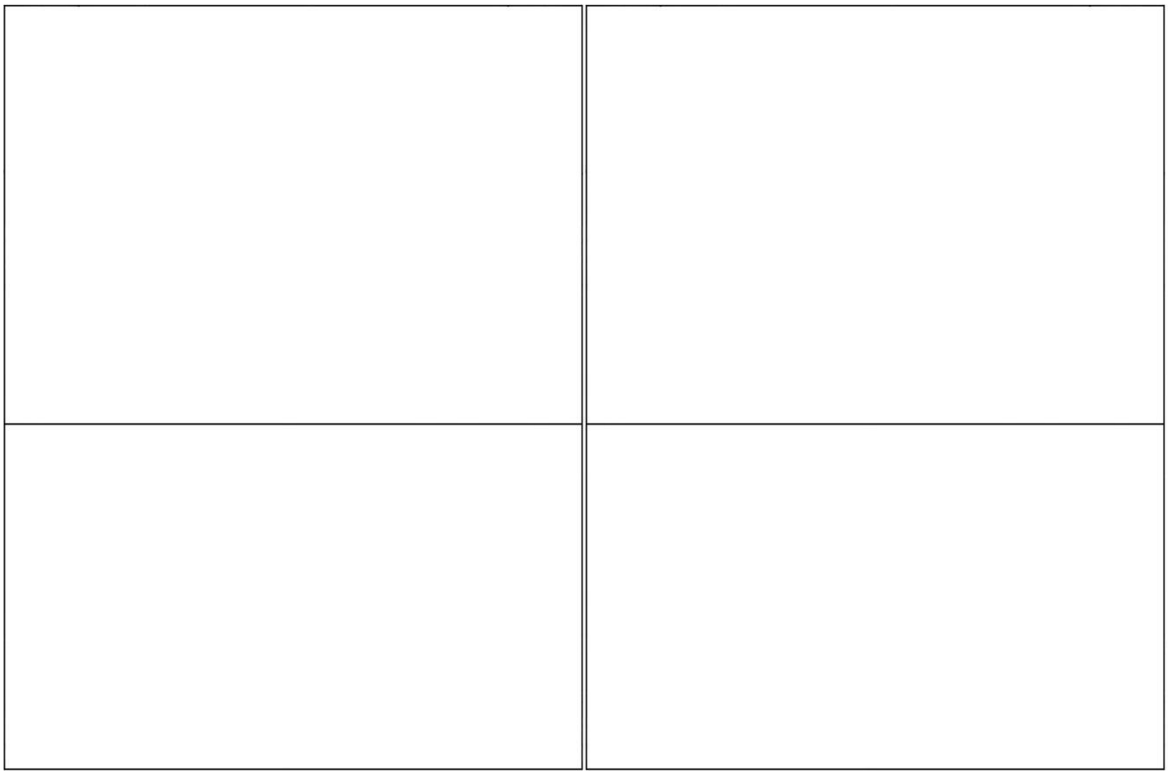
Views of the three-pin adaptor plug to be fitted to Base Units to connect additional racks.



View of adaptor cable (0.5m) to be fitted to Base Units that will not be conjoined.
This is the shortest cable. Other lengths will be available, up to 2.5 metres.



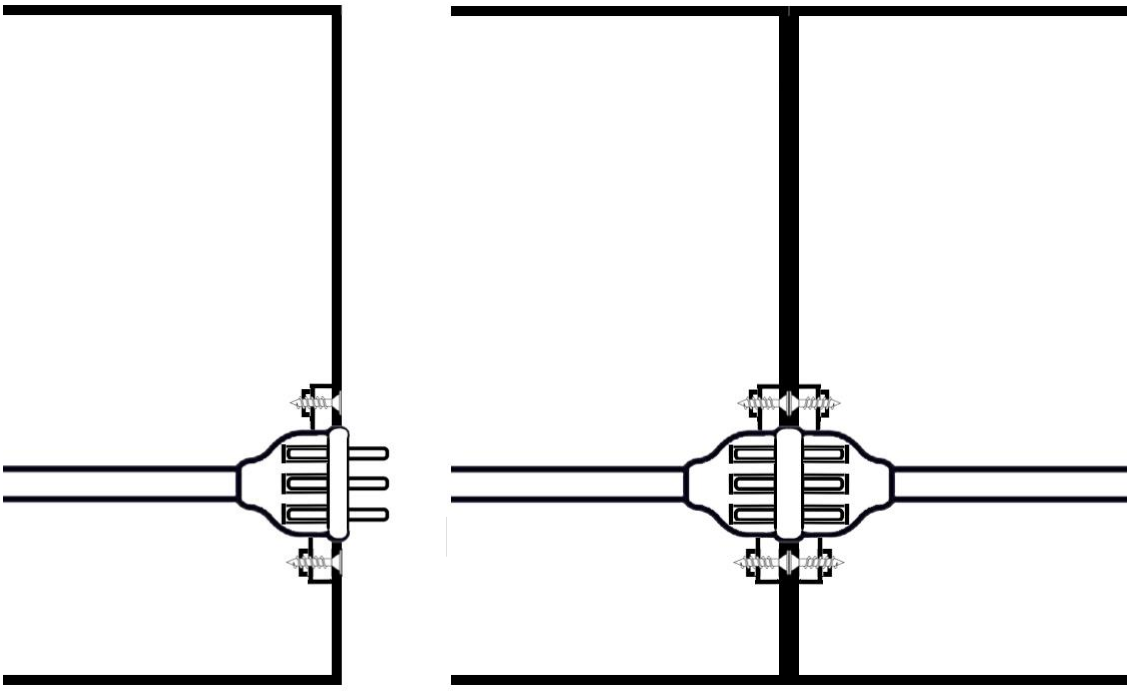
View of two Base Units, side by side. In between is the adaptor that will connect them.



View of Base Units of Primary Rack and Rack Xtra, now conjoined.
Note the space between the two is minimal as the adaptor fits snugly inside the sockets (see below).

An additional rack with a Base Unit (called simply a Rack Xtra) can be plugged into the side of the Base Unit of the Primary Rack using an adaptor and the socket, as above described, in this case

on the right-hand side, creating another 100 slots for more Audio Sticks, again with the ability to relay the information back to the player. So not only can the Rack System be extended vertically, but also horizontally as well, as far as the room will allow. Each set of racks will be flush with the others since the adaptor plug fits snugly into the Base Units in the recess provided, allowing the units to fit tightly together, so there will be minimal, if any, gap between the racks.

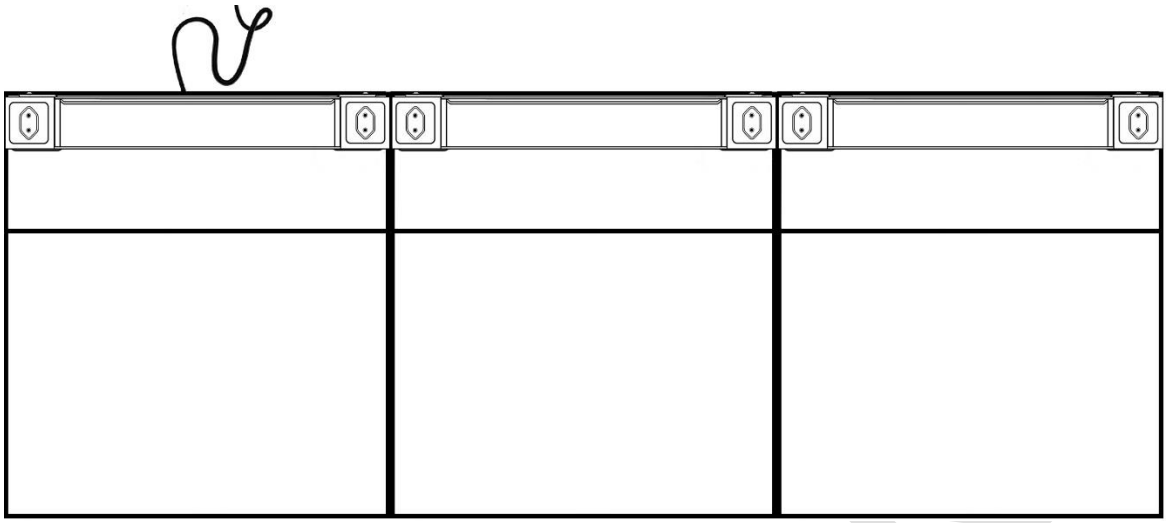


Left: Cross-section of Base Unit showing interior of socket with the adaptor.
Right: The same, demonstrating how two Base Units fit together tightly.

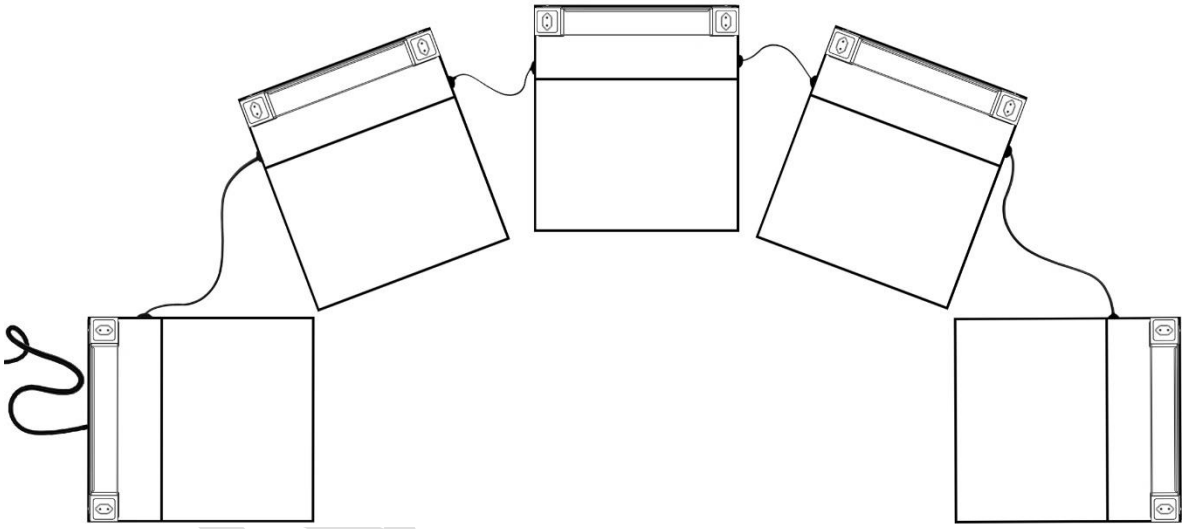
Note, the Rack Xtra does not need to be plugged into the mains as the mains supply is fed into the Xtra Rack from the Primary Rack. Like the latter, the Rack Xtra also has additional sockets at the top and a socket in the Base Unit on the other side so more racks can be added using an adaptor. These all slot into place, side by side, like shelving for books.

If the audiophile would prefer to keep the racks separated rather than attached using the adaptor (as above example), then adaptor cables can be purchased so all the racks can be connected. For example, he may prefer to have the racks separated so they stand to either side of the player (see cover illustration), or standing in a semi-circle rather than a straight line, in the middle of his room rather than up against the wall, or in a circle so he is literally surrounded by music. This is not a problem as various lengths of cables will be available to accommodate his needs.

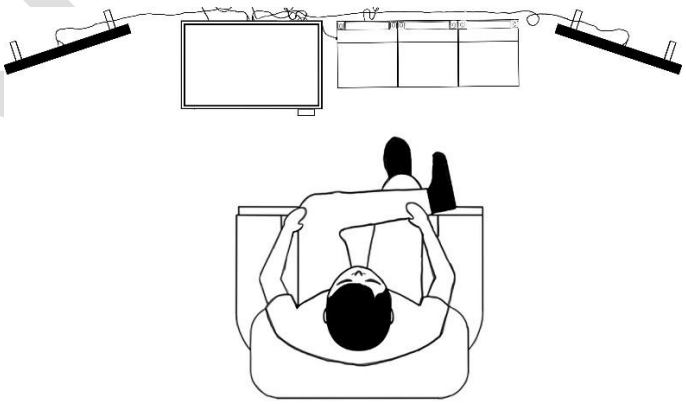
Cable lengths: 0.5m, 1m, 1.5m, 2m, & 2.5m.



Aerial view of 3 Racks connected by adaptors with the Primary Rack on the left joined by 2 Rack Xtras.



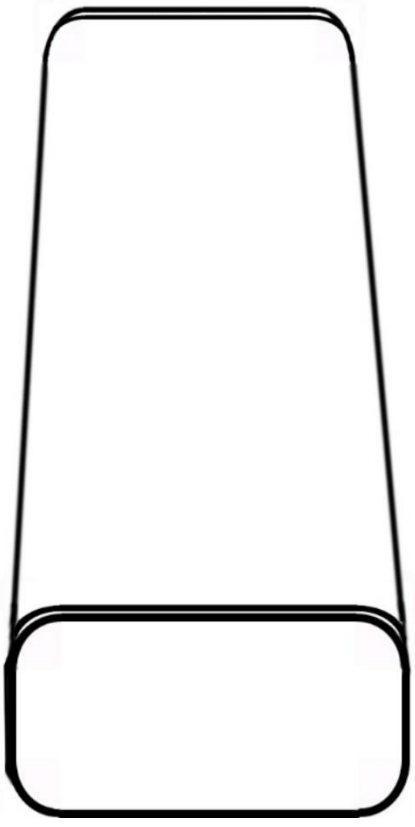
Aerial view of 5 Racks in a semi-circle connected by adaptor cables with the Primary Rack on the left.



Aerial view: Here we have a simple set-up, with the Audio Player in the middle connected to the Primary Rack on the right-hand side. This is connected to 2 Rack Xtras. Note they are not plugged into the mains, only the Primary Rack is. To either side a pair of Magnepan LRS+ speakers. Scale is approximate only.

Audio Sticks

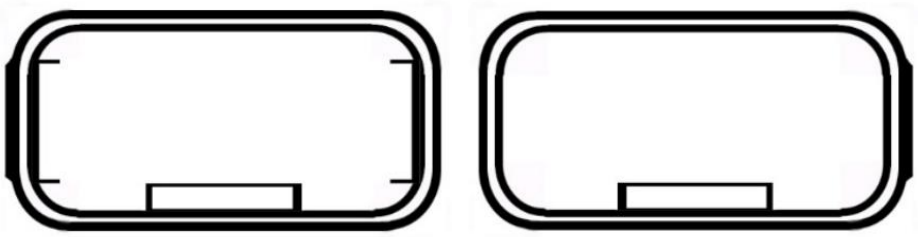
This is the crux of the new system. Essentially, an Audio Stick is a pre-recorded memory stick, the same height and depth as a CD case, in the shape of a rectangular tube, slightly wider than the average memory stick, i.e. 2.54 (width) x 12.5 (length) x 1 (depth) centimetres (or 1 x 4.92 x 0.39 inches). Overall length with ends caps closed = 12.9. Thus, width is a sixth of a standard CD case.



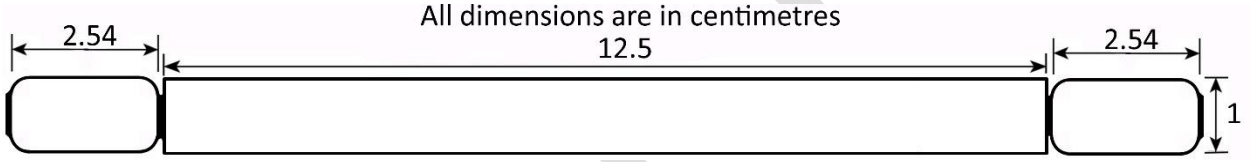
An Audio Stick, end view.

Side view of lid showing pronounced lip and hinge. Lid is 2 mm thick.

Top view of lid showing pronounced lip on left-hand side.



Underside views of lids showing, on the left, top lid with corners for holding electrodes and holder for spring arm, and on the right, bottom lid showing holder for spring arm.

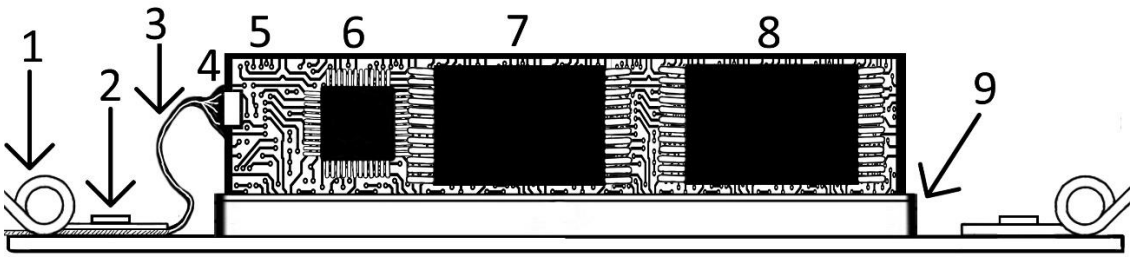


Outer side view of Audio Stick showing both capped ends flipped out on their hinges.

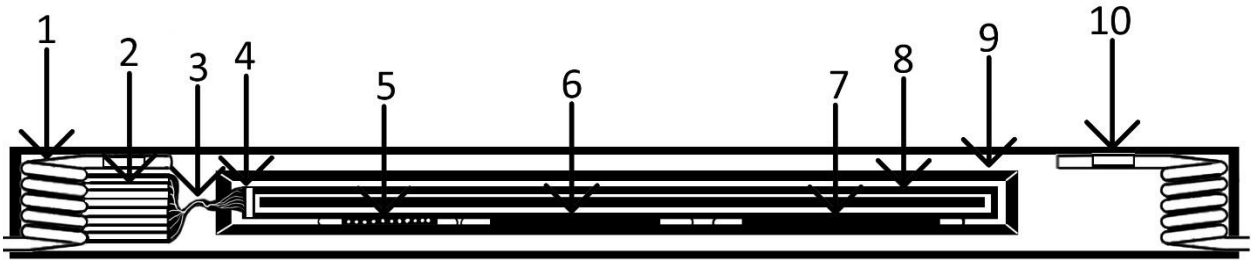
Inner side view of stick showing electrode, bridge/connecting cable, positioning of cat. no. & barcode.

Top view of stick showing both spring arms at the ends, and the electrode at top end.

Bottom view of Audio Stick showing connecting cable/bridge of electrodes to internal components.



Internal side view of Audio Stick's Inner Chamber showing component parts.
1= Spring, 2 = Spring holder, 3 = Ribbon, 4= Connector, 5 = Circuit board, 6 = Controller,
7 = Flash memory (1), 8 = Flash memory (2), 9 = Circuit board anchor.



Internal top view of Audio Stick's Inner Chamber showing component parts.
1= Spring, 2 = Bridge, 3 = Ribbon, 4= Connector, 5 = Controller, 6 = Flash memory (1),
7 = Flash memory (2), 8 = Circuit board, 9 = Circuit board anchor, 10 = Spring holder.

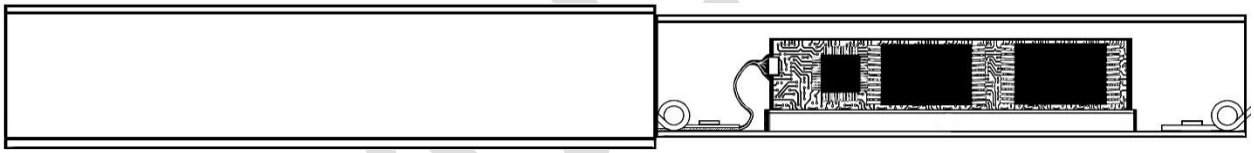
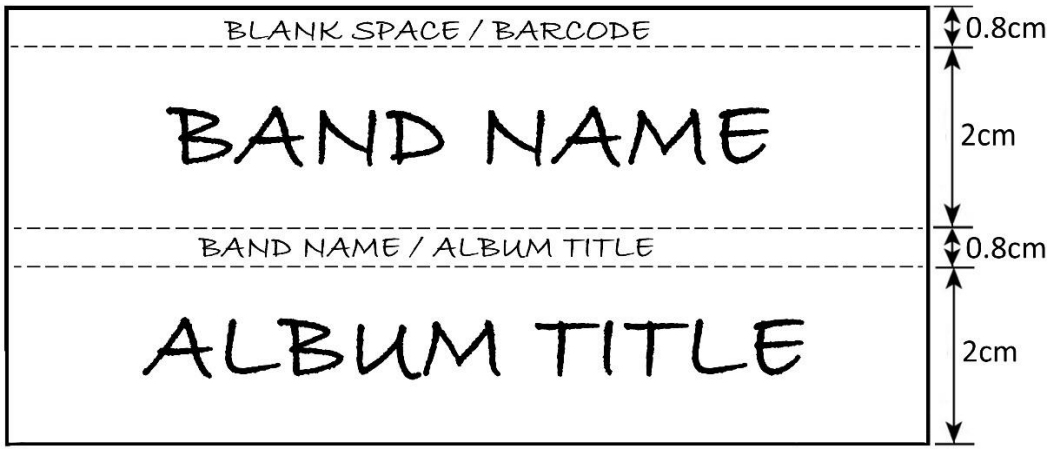
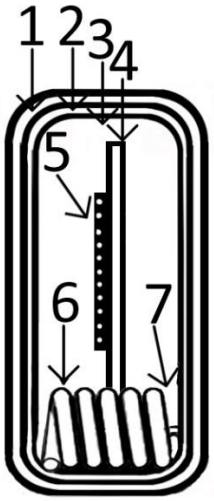


Diagram showing Inner Chamber, once fitted out, is being inserted into the outer casing, with a tolerance of 0.1mm. The thickness of the paper sleeve (below) which wraps round the inner chamber, prior to insertion in the casing, is 0.05mm. This allows for a tolerance of 0.05mm between the two surfaces.

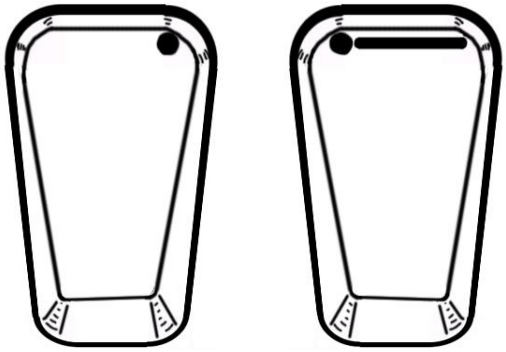


Paper sleeve to be wrapped round Inner Chamber. Note that dimensions of the folded areas are approximate only dependent on the thickness of the paper.
Width of the paper will always be the same length as Inner Chamber, i.e. 12.1cm.



Bottom end internal view of Inner Chamber inserted in casing showing interior parts.
1 = Casing, 2 = Inlay for sleeve, 3 = Inner chamber, 4 = Circuit board
5 = Flash memory, 6 = Spring, 7 = Spring holder.

Top end internal view of Inner Chamber showing interior parts.
1 = Ribbon/cable, 2 = Connector, 3 = Controller, 4 = Spring & Spring holder, 5 = Bridge.



Views of Sunken Chambers (bottom end with hole for spring arm and
top end with slit for ribbon and hole for spring arm) for ball bearing to slide into.

I.M.T.K.

Side view of Sunken Chamber; depth is only 3mm maximum.

Note, depth is to allow for a ball bearing to slide into place which will be dependent on the size of the ball. The other end of the Sunken Chamber must be virtually zero to allow for the spring underneath. The Sunken Chamber is the last part to be fitted to the Inner Chamber. It is glued into place, sealing the chamber at both ends, apart from the holes for the spring arms and a slit for the bridge to the electrodes.

At each end of the Audio Stick is fitted a torsion spring (see below) to keep the end caps closed when the Audio Stick is not inserted in the Rack. When inserted in a slot, the spring's low torque allows the caps to flip open but does not interfere with the stick's performance. The lip on the lid snags with the corner of the Rack, forcing it open when pressed into the slot.

For those who don't know how a torsion spring works, we will give a brief breakdown: torsion springs work by rotating their end along their axis, a flexible elastic object that stores mechanical energy when twisted. When it is rotated, it exerts torque in the opposite direction, which is proportional to the amount of rotation. Because of the rotation, these springs use the radial direction when the force is acting radially. These are generally seen in applications that rotate less than 360 degrees. Torsion springs last a long time and can be easily adjusted to any type of application. We commonly see torsion springs in things like clothes pegs, clipboards, clamps, dog clips, or any other object that requires two opposing surfaces to connect using tension.

Example of a torsion spring.

The casing is made from injection-moulded polystyrene and is transparent. Inside the casing is an inserted paper inlay detailing the contents of the Audio Stick (see illustration below). This inner sleeve wraps round the casing of the Inner Chamber of the stick. Therefore, from the side it looks identical to a CD case. The spine, giving the band's name, album title, etc., is printed on the inner sleeve, like the inlay of a CD. The band name is repeated on the front of the stick in larger letters. On the back is the title of the album, if it is remastered, etc., again in larger letters.

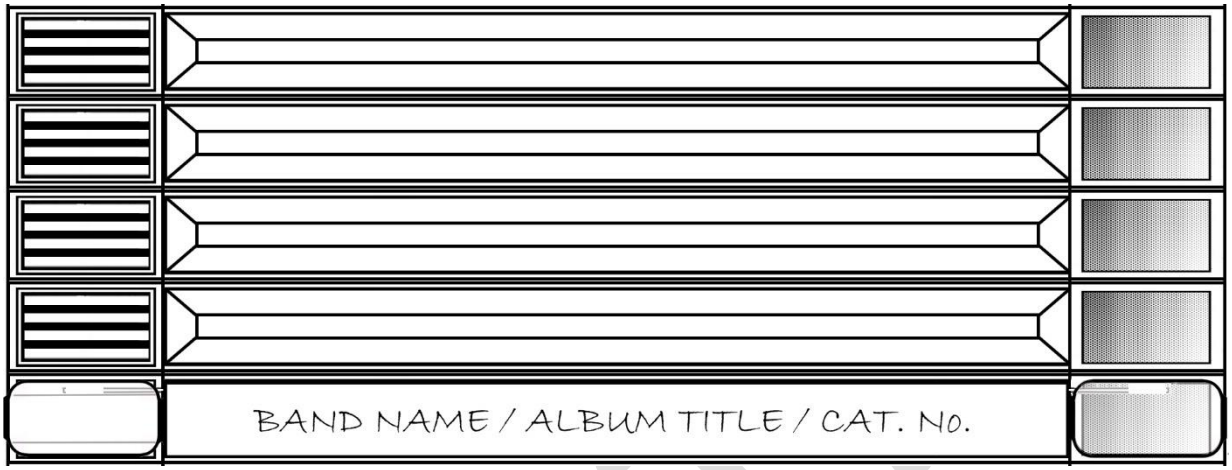
To distinguish Audio Sticks from CD jewel cases, both edges are filleted. This allows for a good grip between the slots of the Rack so that the stick can be easily removed, also to ensure that there is easy insertion into the slot. When inserted fully (i.e. pressed to play) the ends of the stick lock into the Rack by the spring-loaded ball bearings housed in the arms of the Rack which sink into the Sunken Chambers of the stick at both ends. This prevents the stick from popping out accidentally, also to hold the stick securely in place so should there be a sudden shudder, of a large heavy vehicle going by, or even the tremors of an earthquake, the Audio Stick will not dislodge, therefore there will be no loss of sound or interruption during playback. The end caps have a slightly pronounced or exaggerated lip on the inner surface to force them open when pressed into the slot of the Rack. Note that the stick is fully sealed once it is manufactured; there is no way to get at the contents inside without smashing it. There is also no printing on the surfaces of the stick, but on the inner edge of the stick there is embossed the catalogue number, barcode, etc., and other relevant markings for identification purposes. This will also help those who have any sight impairments, either partial or full, as the embossed numbers are easy to feel, so a blind person knows which stick he is selecting prior to insertion into the rack.

For security reasons, since the sticks are so small, and to prevent theft from stores, we recommend that they are sold in a resealable pouch attached to a card. (See mock-up examples below.) We will call this a Display Card. The card is the same width as a normal CD case (i.e. 5.59 inches) so it will fit into a shop's racks/shelving normally used to showcase CDs, with the Audio Stick removed from its pouch. That will be stored behind the counter and returned to the pouch upon purchase. The card is 1 inch taller than the stick itself, so it will be about 5.92 inches, making the card an almost perfect square. At the top of the card will be the band name/album title written in large format, so they are prominently displayed. A customer will easily be able to see and read it when flicking through the cards in the shop. The card can either be disposed of after purchase, as some people used to do with dust jackets of hard-back books, or be retained and kept in a file, drawer, etc., when the Audio Stick has been removed from the pouch and inserted in the Rack. The card will have the LP design on the front, listing exclusive contents, etc. On the back will be the full track listing, etc., that would normally be found on the back of a CD case/LP sleeve. Not only will this help to promote the product, but it may also appeal to those who don't wish to invest in the racks and who would prefer to just use the Portable Audio Player. They can put the Audio Stick back in the pouch when they have finished listening to it.

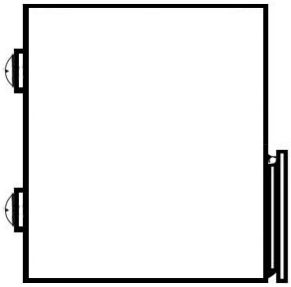
Each stick can contain as much memory as a normal USB memory stick, if not more, therefore there is no need for compression. It would be possible to burn the Master Tapes of each recording to a stick as a lossless or FLAC file, preserving the original quality of the audio.

As we said above, the average CD holds about 600MBs of data, an MP3 version of an album is 45MBs, and audio MP4s are about 200MBs. What if we were to have an Audio Stick that could hold 10GBs of data, if not 20GBs? What would the sound quality be like? In fact, there is room for expansion, as long as the audio player has the capability to read the stick. It would be possible

to fit much more on it, not just the music (full album in HQ) but also all the information related to that album, like the artwork, cover, lyrics (maybe embedded in each track), videos of the songs, live performances, or alternative versions, even demos, should a band really want to impress its fans.



View of an Audio Stick inserted into a slot of the Rack, showing the spine, the end caps flipped out, one end with the electrodes connecting to the sensors, the other with its coloured pane covering the LEDs. Note the arms of the spring and spring holder are partially visible through the clear plastic.

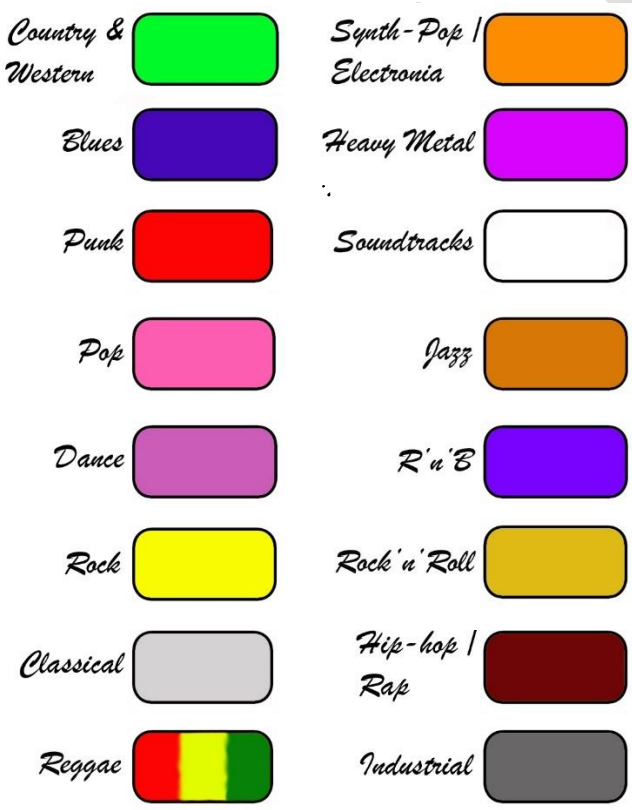


Side view of two slots of the Rack with an Audio Stick inserted.
Note the electrodes on the lid are in contact with the sensors of the Rack.

Cross-section, middle of slot, showing Audio Stick inserted, ready to play. Note metal clip at the back to prevent the stick from being pushed too far in to slot, but once fully inserted, clip is parallel with the back.

Unlike a CD jewel case, which you can open, the Audio Stick is completely sealed, even at both ends where there is a Sunken Chamber for the ball bearings of the arms to slide into. This is a concave piece of plastic with only a hole for the arms of the spring and a slit for the connecting

cable/bridge, the latter being simply an electric ribbon which is attached to the circuit board. Each end of the stick has spring-loaded caps or lids that flip out once the Audio Stick is inserted in the slot of the Rack. The top of the stick flips open to allow the electrodes on the inside of the lid to connect with the sensors on the rack. The bottom of the stick is a plain piece of plastic which flips open and covers the LEDs when pressed to play. Note the LED light is the same size as the pane of the lid and is neutral in colour, i.e. white, but the pane of the Audio Stick can be coloured according to the genre of music the stick relates to. For example, C&W = green, Blues = blue, Punk = red, Pop = pink, Dance = mauve, Rock = yellow, Classical = silver, Reggae = red/yellow/green, Synth-Pop / Electronica = orange, Heavy Metal = purple (as in Deep Purple), Soundtracks = clear (i.e. white), Jazz = brass/copper, R'n'B = indigo, Rock 'n' Roll = gold, Hip-hop / Rap = brown, Industrial = grey, etc., so when playing you know what genre of music you are listening to, according to the manufacturer of the Audio Stick.



Example of colour classification of genres according to Audio Stick format.

Upon purchasing the Audio Stick, and taking it home, you remove it from the pouch of the display card and its protective covering (a simple cellophane jacket which may also have an obi strip—see Appendix—to help identification). This is to not only to protect it from water and moisture, but to retain the smell of its freshly manufactured origins. (This is to be added artificially to the stick to give it something special.) You insert the Audio Stick in a slot (similar to the old CD racks). The top and bottom lids flip out as the stick clicks into place. It comes into contact with the metal clip at the back of the Rack. This clip is to prevent it from being accidentally pressed too

hard and has the right amount of tension (as in a spring) to hold the stick. When the stick is pressed harder, it is forced further into the slot, the ball bearings pop out on either side from the arms of the Rack and lock the stick in place, the electrodes connect with the sensors and the album starts to play. This is the same as pressing a 'PLAY' button. The stick's electrodes pass the information through the sensors to the Audio Player. The player reads the stick's information, in much the same way as a computer would read a USB memory stick when it is inserted into one of its ports. The LED light comes on indicating the audio stick is in play. The audio player begins to play the first track of the album or recording. If you want to skip that you can press 'NEXT', and it will go to the next track. Or if you bring up the info on the screen you can scroll down to the desired track, press 'PLAY' and it will jump to that track. To stop the music, you simply press the stick again and it will pop out enough to release it from the ball bearings, thanks to the metal clip at the back. You can also press 'STOP' on the remote or player. However, this does not make the Audio Stick pop out from the 'play' mode as the racks do not have any mechanical means of doing this. You have to do it yourself by pressing the stick again. Also note that only one stick can be played at a time, for obvious reasons. But what you can do is press a series of sticks in the order you want to hear them, each stick will make contact with the sensors, passing that information to the player, which will memorise the playlist, and will play each stick in turn successively. The selected Audio Sticks will remain in play mode till they are pressed again to stop them playing.

Convenience of the Rack System

The convenience of this system is it does not take up a lot of space. If you think how small the size of the spine of a CD case is, with the Audio Stick the same height and thickness of a case, but a sixth of the width of the case, it will take up less space than a load of CDs on the shelves.

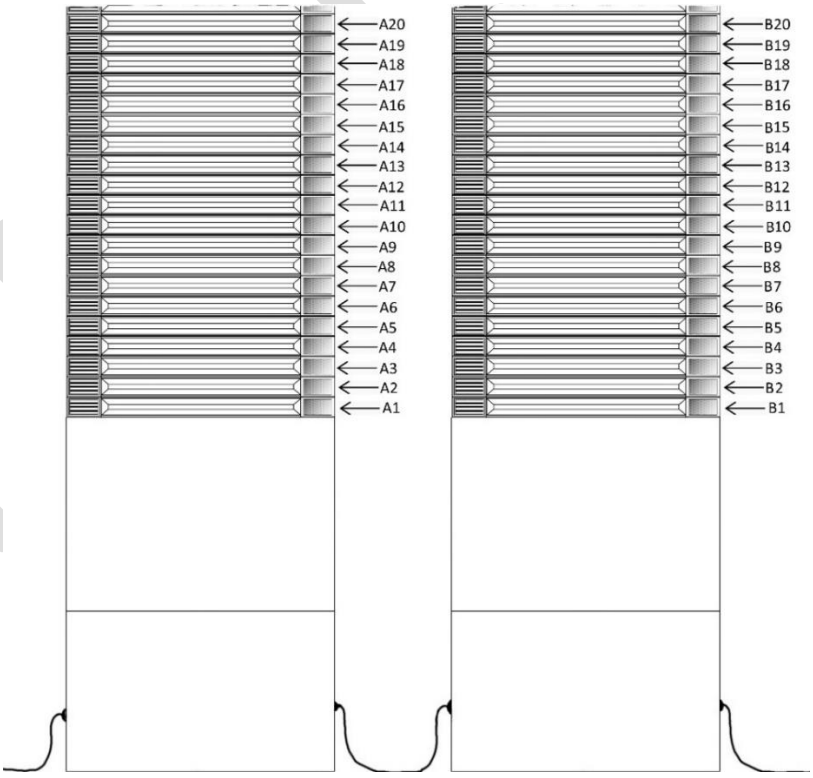
As with an iPod, you can shuffle, jump forward to the next track, pause, repeat, even get the track history (as already mentioned).

You can keep adding Audio Sticks to the system. It is only limited by the number of slots available. Alternatively, if, for example, you get bored of one album, there is no harm in removing the stick, putting it back in its display card (as long as it has not been thrown away) and keep it elsewhere for storage, or even sell it. Then insert a new stick in the vacant space and the player will overwrite the previous entry.

The player will memorise each Audio Stick that is inserted in the rack, and update any changes, getting that information from the stick. As the player has infinite memory, so it would be possible to hold 1000s of albums, singles, maxi-singles, etc., and is a vast improvement on fumbling around with a CD that seems to be stuck in its holder (I remember having once to literally pluck it out from its case with the CD practically bending in half because it refused to budge, or even worse, the teeth had broken so the CD was sitting loose in its case, getting scratched) or an LP (which could also get scratched if not removed from its sleeve and cover carefully) and placing it on the

turntable. The Audio Stick is unbreakable, sturdy, and reliable, as long as it is looked after properly, and stays in its slot on the rack, in the same way a CD would remain on a shelf, the only difference is you don't have to pick it up, like you would do a CD, or open its case and insert it in a CD player. You can skip all that by leaving it on the rack, and when you want to listen to that album, just press it and it will start automatically. You know where to find a CD because you remember where you put it. This is the same principle.

Audio Sticks do not warp like vinyl LPs. A stick does not get scratched. It does not make hissing noises or clicks. Unlike old cassette tapes that get worn out, or where the tape unspools and gets tangled up in the player and ends up getting eaten, the Audio Stick will keep playing. Further, as it is not rewritable (the data can only be burned to the stick once) it has a far longer longevity than an ordinary USB memory stick. According to the file type and format, etc., the latter is said to have an average length of use which amounts to about ten years, although this is disputed by some experts who claim they should normally last longer than that. An Audio Stick, however, is not a memory stick, its only commonality being that it uses flash memory. It will last indefinitely, with proper care and attention. It is convenient to carry around, and small enough to fit in the top pocket of your shirt. Also, should the Rack System not be in use for a while, and dust maybe a problem, you can buy dust covers to fit over the racks. When removed from the Rack, the caps of the Audio Stick flip back into place, protecting the electrodes, allowing for safe transportation, etc.



Front view of Rack System showing Primary Rack on left and Rack Xtra on right, and slot IDs.
Note the Primary Rack is always designated 'A' in the player's memory, as in 'Drive A',
and the first slot is 1, second is 2, third is 3, etc. Additional racks will be designated B, C, D, E, etc.

Further, the Audio Player is always in standby mode, and only comes on when the Audio Stick is pressed (as you would do a button). If the stick has been played before, then the music will start straight away as the information is already stored in the player's memory. We may expect a slight delay of a few seconds, however, if it is new and therefore unread.

The search function on the Audio Player can be used if you cannot remember where a particular Audio Stick is. Once identified, it will give the location, say B28, then it is just a matter of physically finding it. Go to rack B. Count up from the bottom slot (B1) till you come to B28. (I used to spend ages trying to find an LP out of the thousands in my collection, wasting valuable time, thinking I was being clever by putting them in alphabetical order when really, they should have been arranged according to genre.) At least in this way you have a rough idea where it is. Another way, of course, would be to keep all your Audio Sticks in order of genre, going by the colour of the end caps. The same can be done here, by putting the sticks in the slots of each rack in genre order. It may not be practicable if new items need to be added, but at least you have some sort of organised arrangement.

Rack System Versatility

The whole point about the Rack System is that once it is in place, the racks can be continued indefinitely, infinitely expanded upon by the addition of more racks, as the Audio Player of the Rack System has unlimited memory. It retains all the data relevant to every album stored in the racks as it keeps a record of each one that has been played and knows where it is located.

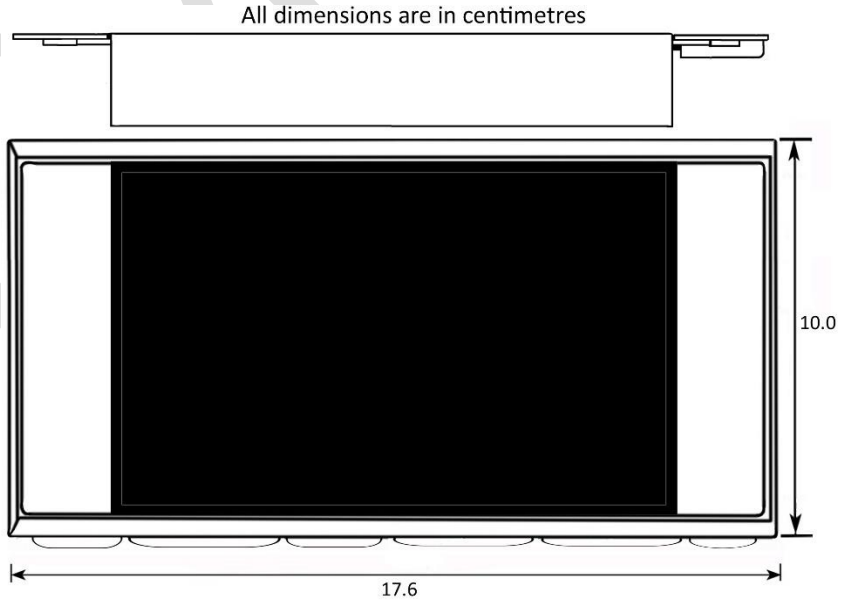
For example, once the Primary Rack has been set up, and Audio Sticks have been inserted in the slots and played, the player will make a note of each album—only if it has been played. Each slot of the Rack has an identifier (see above figure). The first slot on the Primary Rack is listed as A1, the one above that is A2, then A3, A4, A5, etc., all the way to the top slot, A100. Once an additional rack has been added on top, the player will recognise a change in the hardware and reconfigure the listing and will continue the successive numbers, so the first slot on the additional rack (or Rack Xtra WBU) becomes A101, the next A102, then A103, etc., all the way to A200. With the addition of another Base Unit (or Rack Xtra), once plugged in, again the player will reconfigure the combination, so that the bottom slot of that unit becomes B1, the one above that B2, then B3, B4, B5, again all the way to the top to B100. Likewise, this can be extended with an additional rack (Rack Xtra WBU) so the next slot becomes B101, then B102, etc., to B200. Another rack, with Base Unit can be added. Again, the system configuration will be updated so it recognises the addition, with the first slot on that unit being designated C1, the next, C2, then C3, C4, etc. (Again, consult the figure above.)

Yet the player will not know what is held in the B1 or C1 slot until the album in that slot has been played. It is only when the Audio Stick is pressed (for 'ON') that the information gets fed to the player, and memorised. Also, should a re-arrangement be required, the player again has the ability

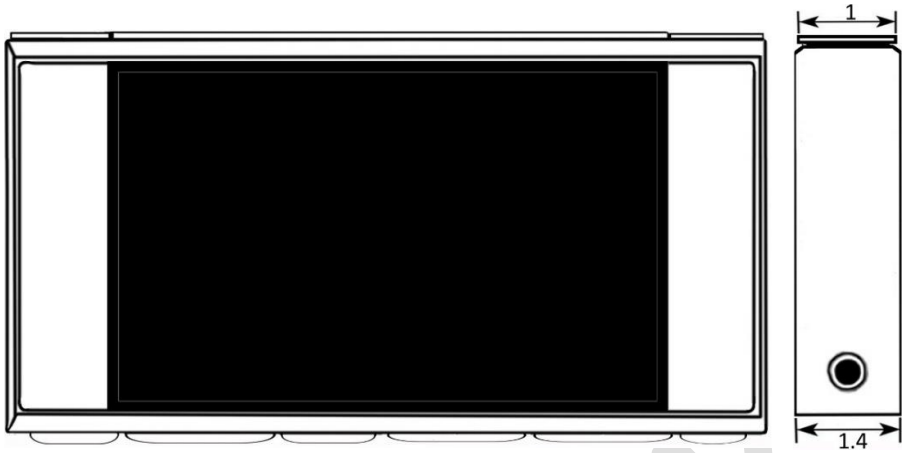
to reconfigure. If, for example, the album in slot B26 is moved to slot A23, and the album in slot B43 is moved to slot A24, and the album in slot B66 is moved to slot A25 (the audiophile may wish to keep all his albums by the same band next to each other) then the player will update the information, make a new note of that, erasing the old entry, and store the new information in its index, in much the same way as when we move a file on a computer from one drive to another. A file system error can only occur when it is down to human tampering, otherwise the system is foolproof. All the information is stored on the hard-drive of the player. Should the audiophile not be happy with this, it can be converted to a Solid State Drive (SSD) once all the data has been transferred to a USB memory stick for back-up and then installed on the SSD. Incidentally, it may be a good idea to do a back-up occasionally to an external drive should anything go wrong with the internal drive (as in data loss, system file corruption, mis-indexing, or simply a bug in the system) otherwise the player will have to re-learn all the data relevant to each slot, and that can only be done by playing all the Audio Sticks again. Further, if an Audio Stick has been played, but the album never finished, the Audio Player will give the option to pick up where you left off. So, it is vital all the information is correct.

This will be vastly different from the old way of playing music. It won't be the same as buying good old analogue tapes on cassette, then having to buy a decent tape player, like ION Audio, Denon, Marantz, Nakamichi (see examples in the Illustrations section), etc., to play them on, then opening the cassette deck, inserting the tape, all the while praying once you have pressed 'play' it does not chew the tape up, and having to listen to that dreadful hissing sound, even if it does have Dolby. This system is foolproof, and the audio reproduction is perfect.

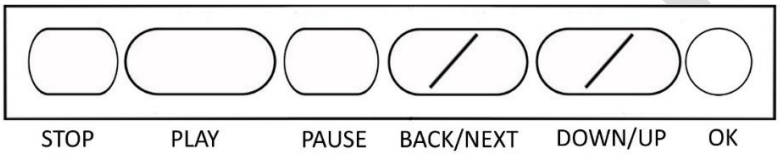
Portable Devices



Front view of Portable Audio Player showing dimensions and stick about to be inserted.
Note the screen has the same aspect ratio as the Audio Player and is a miniaturised version of the same.

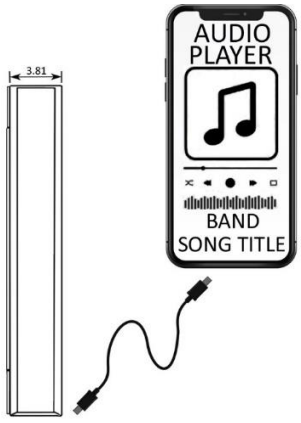


Front and end views of Portable Audio Player showing stick inserted, also phono jack on the end.



Side view of Portable Audio Player showing button functions.

The Audio Player will not be limited to the living room: there will be a portable unit, akin to a Sony Walkman MP3 player (see Illustrations) and is about the same size. It has a small screen to navigate albums and select tracks, with stop, play, pause, back/next, down/up, OK buttons. It is 4mm thicker than the depth of the sticks themselves and a great way to listen to your new purchase, once you have left the shop and cannot wait to get home. Upon purchasing the stick, you clip it onto the player, the top end flips out and lines up with the sensor, the bottom flips out to cover the LED light. The ball bearings of the player lock into place (thus preventing any jolting or accidental skipping during play) when you press the stick down further to play it back. The electrodes and sensors connect, the LED lights up, the music begins to play. Using a pair of Bluetooth earpods, you can listen to your purchase, and if on a bus or the tube, you can read all its info on the screen.



View of Mini-Portable Audio Player and how it connects with smart phones.
Note, items shown are not in proportion and are suggestive only.

And like the Audio Player there are two types of portable devices, or Audio Stick players, one is the integrated unit we have already discussed, the other is the Mini-Portable Audio Player. This is much slimmer, hence the name 'Mini' as it does not feature a screen or any buttons. The Mini is designed to be plugged into a smart phone using its recharging port with a port adaptor to suit either an Android phone or an Apple phone. Download and install the Audio Player app which allows a user to navigate tracks on the Mini-Portable Audio Player with its user-friendly interface (see illustration above). The player has a lithium battery (rechargeable through a USB port), but no earphone socket. You use the earphone socket on the phone. It features High-Resolution Audio which allows you to get closer to the original studio recording by using the DSD format, and supports balanced and high-power output, as well as reducing distortion and noise across a wide range of frequencies, for a rich and full-bodied sound, enhanced by the natural sound, intense detail of the DSD audio format thanks to its high-quality PCM conversion.

Two views of the Sony Walkman NWZ-B183 MP3 player with 4GB memory.

It is interesting to note that Sony recently brought out the Walkman NWZ-B183. It is what they call an 'audio player' as it can play music stored on its flash drive. You plug it into a PC using its USB interface, copy MP3 files to it as you would do with a memory stick, and then playback tracks whilst listening to them through the supplied earphones. It also has a built-in FM tuner. However, this is very different from our concept. An Audio Stick is not a memory stick. It is not rewritable. You cannot keep adding files or copying and deleting them; if anything, it is a pre-recorded memory stick, and that's the best way to describe it for the sake of convenience, but it is not USB, and it cannot be plugged into a computer, although of course one day someone will invent an adaptor so that it can be plugged into a computer and all the audio (in HQ format) can be transferred to the computer's hard-drive (the Mini-Portable Audio Player will probably allow for this option, with a USB adaptor). That is by and by and has nothing to do with what we are offering here.

Wizo's Stick EP, released in 2004.

Note also, back in 2004 a German punk band called Wizo brought out a single ('Stick EP') on a USB stick, and apparently was one of the first bands to do so. Again, we need to make the distinction, and before anybody accuses us of plagiarism, even though we had never heard of the band till we started writing this paper, that is a USB stick. It is nothing like an Audio Stick as it does not have a removable lid or cap, it does not have printing on the side, and it cannot be plugged into a PC. An Audio Stick is unique in that you need the Audio Player to play it, an Audio Player designed by us, not what Sony brought out. I hope that clarifies matters to avoid any further ambiguity.

It's 2024. We are now entering a new era of music listening. Who knows, we may see you at the next Consumer Electronics Show with our special product, if things go according to plan.

Future Adaptions

This system can, of course, be adapted to DVDs and Blu-rays. The Video Sticks will be the same thickness and height as the cases of DVDs/Blu-rays, but about a sixth of the width. However, they are likely to be more expensive as they will hold double, treble, if not quadruple the data of an Audio Stick, anything from 16GBs up to 64GBs of data, with an exceptional picture quality as again there will be no need for compression. An extras folder will include additional data, like videos of behind the scenes, actors' interviews, etc. The Audio Player can be either modified or upgraded to play the larger size files, or a new model brought out which we would call a Video Player, obviously. An external device like a television or projector can be plugged into it using the HDMI socket, enabling films to be watched on a large screen. The possibilities in this direction are endless, so we can leave that to further debate.

Conclusion

The Rack System, if properly implemented will replace old, antiquated systems, and offer a far better format for listening to music. The cost to implement such a system will initially be expensive until new, cheaper models become available once the technology is fully integrated. At the start, it may not be readily accepted by the majority of the record/CD buying public who will dislike certain aspects or be put off by the cost of the initial outlay. Like me, when I was originally sceptical about adapting, I grew to see the benefits of CDs, comparatively speaking, and economically it made sense to purchase them as sometimes they were cheaper than vinyl LPs, as well as helping to save on much needed space.

We are not trying to convert people to switch to the new system entirely, we also appreciate some of the drawbacks such a new system offers. After all, the format is not readily acceptable to current DJs as the Audio Sticks do not play like records; you cannot spin an Audio Stick on a turntable and do wizardry things like scratching by playing the Audio Stick back and forth, as you can do with a 12" platter. The Audio Stick is not meant for that purpose. It has been designed for

connoisseurs of music who appreciate good production and are desirous of having it delivered in its highest quality so the full body of the music can be listened to and appreciated. Therefore, audiophiles who have the money may well seize upon it, others may not.

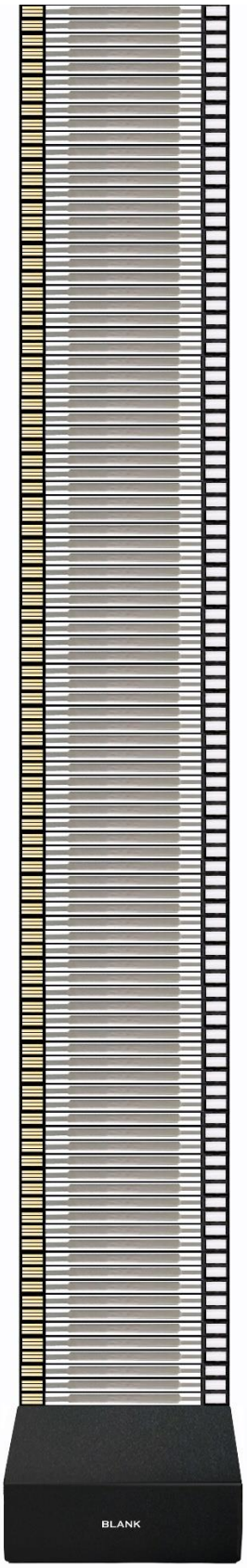
Yet once the system is comprehended to be better, and is embraced by more audiophiles, there should be a gradual, subtle shift over to the new format by other parties, with many others becoming converted once there is a drop in prices, making the product more affordable for many. It is impossible at present to fix a price on any of this, but in the long run the Rack System may work out far cheaper as Audio Sticks will be no more expensive than USB memory sticks, but that is entirely dependent upon the record/music industry, with executives fixing prices to make it economically viable for the recording artistes to make enough money through royalties without frightening potential purchasers away with exorbitant prices.

Now, having said that, and asserted our belief in the possibility of such a system, all we need is a team to help us design and build each component to demonstrate how this system really works.

I.M.I.T.K.

MOCK-UPS

Integrated Audio Player



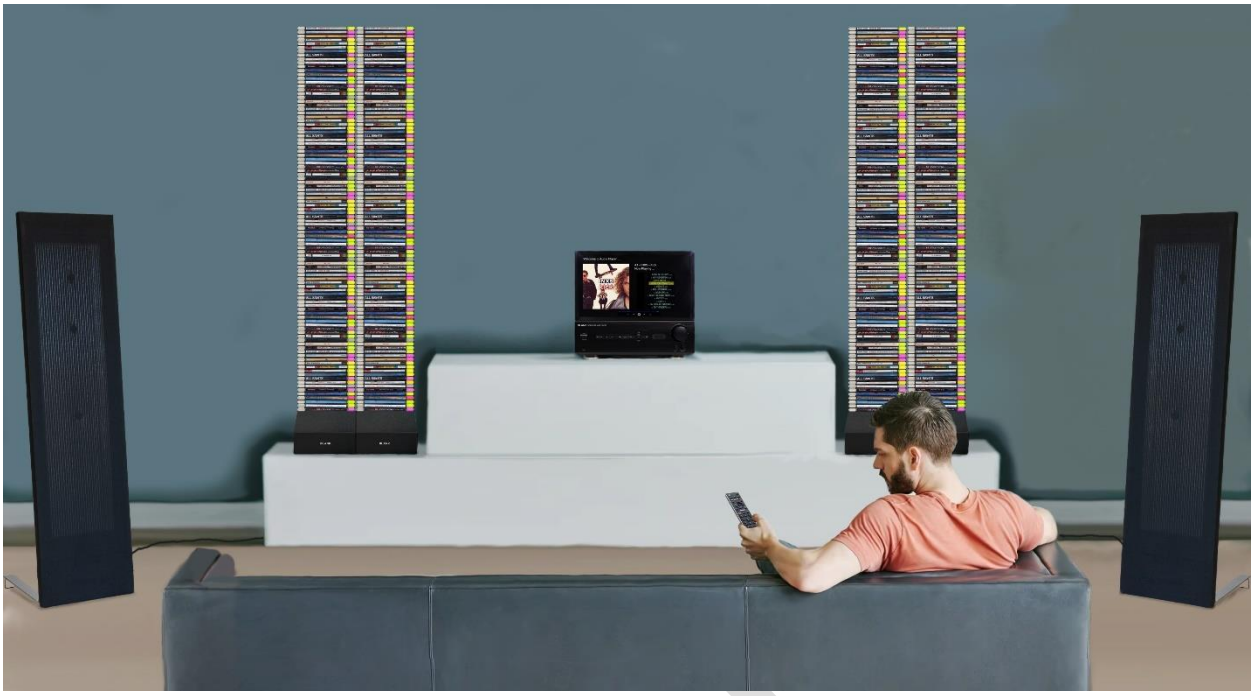
Primary Rack (i.e. Base Unit with 100 Slots)

An Audio Stick, top and bottom views.

Spine of Audio Stick showing end caps in place.

Section of Rack (A1-A5) showing Audio Stick in a slot, end caps flipped out, one covering the sensors, the other covering the LED. Note, it is yellow, designated ‘Rock’, in the Audio Stick scheme.

Screen of Audio Player showing what it is playing: ID, band, album, track title & no., progress bar, etc.



Example of a Home Audio Set-Up.

Here we have a unique set-up, with the Audio Player in the middle, the speakers to either side, spatially separated for better stereo effect. The Primary Rack on the far left is connected by an adaptor to the Rack Xtra next to it, but there is a gap between the other racks. They are to the right of the player, connected by an adaptor cable. These two Rack Xtras are connected to each other by an adaptor. This is aesthetically far more pleasing, lending a sense of balance to the room to hold the 400 Audio Sticks, mostly Rock & Pop.

Side view of Portable Audio Player, showing an Audio Stick inserted into the player, with a track in progress. Note the end cap is yellow to designate the ‘Rock’ genre, with the LED underneath lit up.

Card Display, example #1, front and back.

Sex Pistols - Never Mind The Bollocks Here's The Sex Pistols
SPECIAL EDITION
Includes bonus tracks of alternative takes and the 'Making of' documentary
NEVER MIND THE BOLLOCKS
HERE'S THE
SEX PISTOLS
SEX PISTOLS

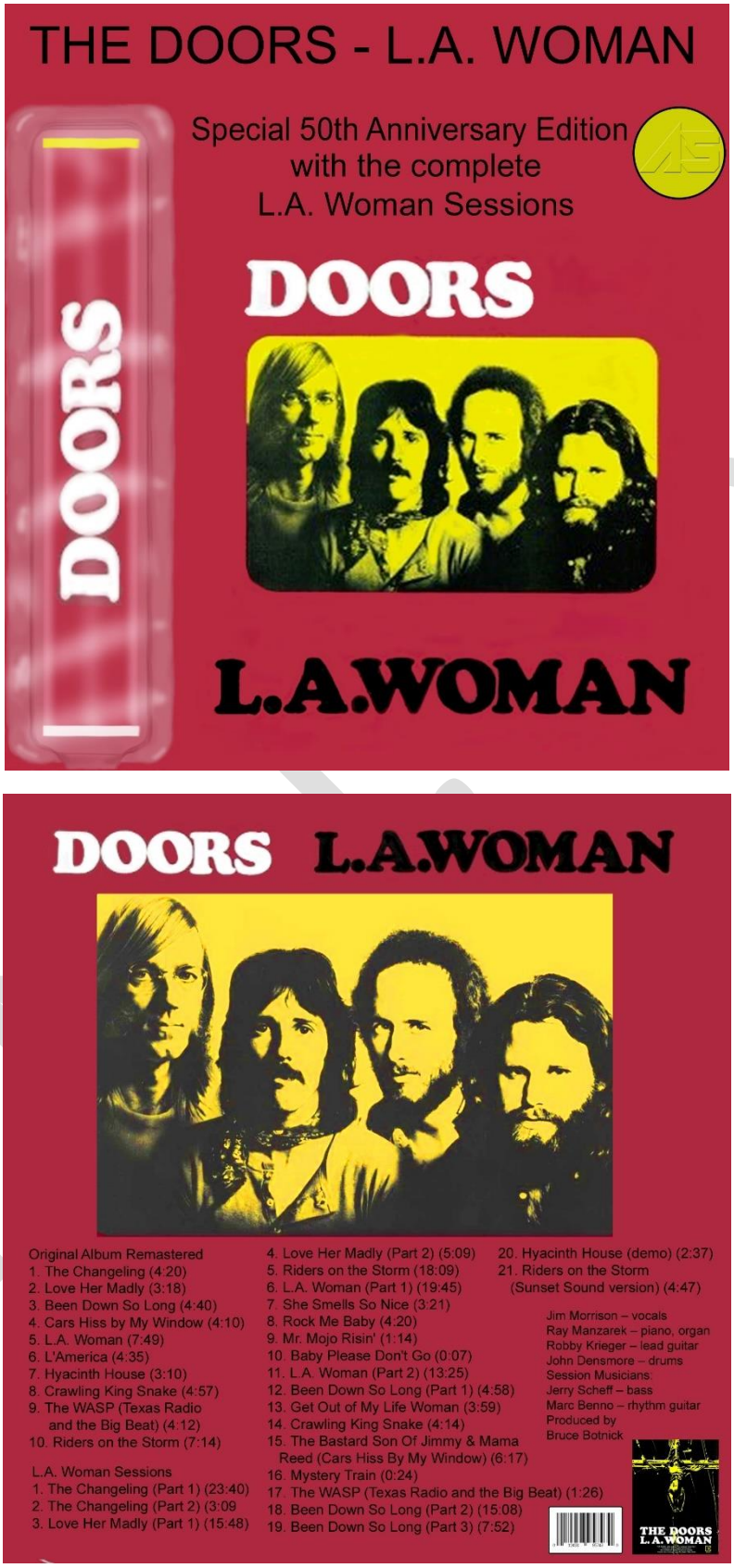
pretty vacant
liar
no feelings
ANARCHY IN THE U.K.
V 2086
NEW YORK
GOD SAVE THE QUEEN
SEVENTEEN
bodies
problems
EMI Unlimited Edition
holidays in The Sun
SUBMISSION
BONUS TRACKS
1. Seventeen
2. Satellite
3. No Feelings
4. I Wanna Be Me
5. Submission
6. Anarchy in the UK
7. God Save the Queen
8. Problems
9. Pretty Vacant
10. Liar
11. EMI
12. New York
13. Problems
14. No Feelings
15. Pretty Vacant
16. Submission
17. No Feelings
18. EMI
19. Satellite
20. Seventeen
21. Anarchy in the UK
Tracks 1-5 recorded at Dave Goodman sessions, Riverside/Denmark St, July 1976, track 6 recorded at Dave Goodman sessions, Wessex Studios, October '76, tracks 7-12 recorded at Dave Goodman sessions, Gooseberry Studios January 1977, tracks 13-15 recorded at Chris Spedding sessions, Majestic Studios May 1976, tracks 16-20 recorded at Chris Thomas Never Mind the Bollocks sessions, Wessex, summer 1977, track 21 recorded at Dave Goodman sessions,Riverside/Denmark St, July 1976.
SPECIAL BONUS FEATURE: The making of the album Never Mind the Bollocks ... documentary with the surviving members of the band, and the engineer and producer.

Card Display, example #2, front and back.

NIRVANA - NEVERMIND
SPECIAL 30th ANNIVERSARY EDITION WITH BONUS TRACKS INCLUDING THE ORIGINAL ALBUM REMASTERED AND 61 LIVE TRACKS
NIRVANA
NIRVANA
NEVERMIND

NIRVANA
NEVERMIND
SPECIAL 30TH ANNIVERSARY EDITION
Commemorating the 30th anniversary of Nirvana's seminal 1991 release, the Nevermind Super Deluxe is the newly remastered album from the original analog tapes, along with 4 complete concerts on the Nevermind Tour from Amsterdam, Melbourne, Tokyo, and Del Mar, California. Also included are the tracks "Endless, Nameless," "Even In His Youth" and "Aneurysm," from a 7" single version, plus a 40-page spread with unreleased photos.
Nevermind (Original LP Remastered)
1 Smells Like Teen Spirit
2 In Bloom
3 Come As You Are
4 Breed
5 Lithium
6 Polly
7 Territorial Pissings
8 Drain You
9 Lounge Act
10 Stay Away
11 On a Plain
12 Something in the Way
Bonus tracks:
1 Drain You
2 Aneurysm
3 School
4 Floyd the Barber
5 Smells Like Teen Spirit
6 About a Girl
7 Polly
8 Lithium
9 Sliver
10 Breed
11 Come As You Are
12 Been a Son
13 Negative Creep
14 On a Plain
15 Blew
16 Love Buzz
17 Territorial Pissings*
* Live in Amsterdam, Netherlands (Paradiso, November 25, 1991)
1 Drain You
2 Aneurysm
3 School
4 Floyd the Barber
5 Smells Like Teen Spirit
6 About a Girl
7 Polly
8 Sliver
9 Breed
10 Come As You Are
11 Lithium
12 Territorial Pissings*
* Live in Del Mar, California (O'Brien Pavilion, Del Mar Fairgrounds, December 28, 1991)
1 Aneurysm
2 Drain You
3 School
4 Sliver
5 About a Girl
6 Come As You Are
7 Lithium
8 Breed
9 Polly
10 Lounge Act
11 In Bloom
12 Love Buzz
13 Smells Like Teen Spirit
14 Negative Creep
15 On a Plain
16 Blew*
* Live in Melbourne, Australia for Triple J (The Palace, St. Kilda, February 1, 1992)
1 Negative Creep
2 Been a Son
3 On a Plain
4 Blew
5 Come As You Are
6 Lithium
7 Breed
8 Sliver
9 Drain You
10 About a Girl
11 School
12 Aneurysm
13 Love Buzz
15 Territorial Pissings
16 Smells Like Teen Spirit*
* Live in Tokyo, Japan (Nakano Sunplaza, February 19, 1992)

Card Display, example #3, front and back.


THE DOORS - L.A. WOMAN
Special 50th Anniversary Edition
with the complete
L.A. Woman Sessions
DOORS
DOORS
L.A.WOMAN
DOORS L.A.WOMAN
Original Album Remastered
1. The Changeling (4:20)
2. Love Her Madly (3:18)
3. Been Down So Long (4:40)
4. Cars Hiss by My Window (4:10)
5. L.A. Woman (7:49)
6. L'America (4:35)
7. Hyacinth House (3:10)
8. Crawling King Snake (4:57)
9. The WASP (Texas Radio and the Big Beat) (4:12)
10. Riders on the Storm (7:14)
L.A. Woman Sessions
1. The Changeling (Part 1) (23:40)
2. The Changeling (Part 2) (3:09
3. Love Her Madly (Part 1) (15:48)
4. Love Her Madly (Part 2) (5:09)
5. Riders on the Storm (18:09)
6. L.A. Woman (Part 1) (19:45)
7. She Smells So Nice (3:21)
8. Rock Me Baby (4:20)
9. Mr. Mojo Risin' (1:14)
10. Baby Please Don't Go (0:07)
11. L.A. Woman (Part 2) (13:25)
12. Been Down So Long (Part 1) (4:58)
13. Get Out of My Life Woman (3:59)
14. Crawling King Snake (4:14)
15. The Bastard Son Of Jimmy & Mama Reed (Cars Hiss By My Window) (6:17)
16. Mystery Train (0:24)
17. The WASP (Texas Radio and the Big Beat) (1:26)
18. Been Down So Long (Part 2) (15:08)
19. Been Down So Long (Part 3) (7:52)
20. Hyacinth House (demo) (2:37)
21. Riders on the Storm (Sunset Sound version) (4:47)
Jim Morrison – vocals
Ray Manzarek – piano, organ
Robby Krieger – lead guitar
John Densmore – drums
Session Musicians:
Jerry Scheff – bass
Marc Benno – rhythm guitar
Produced by
Bruce Botnick
THE DOORS
L.A.WOMAN

Card Display, example #4, front and back.

Part Three: Miscellanea

Appendix 1

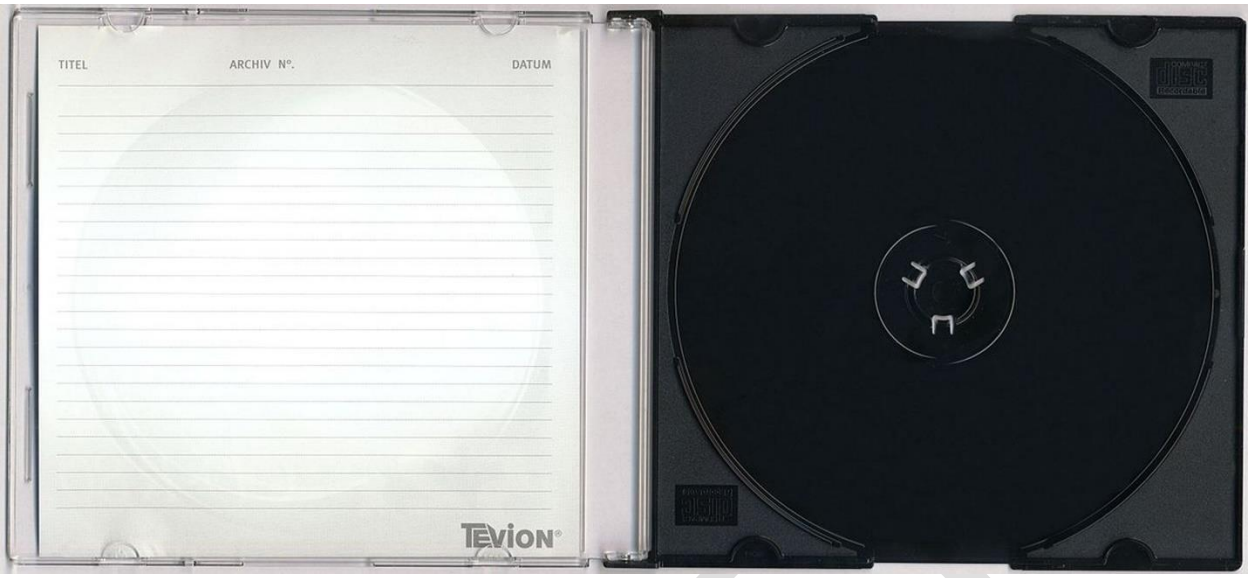
A Brief Look at CD Cases and the Various Types of CD Packaging

Optical disc packaging is the name given to the cases that accompany CDs. Most packaging is rigid or semi-rigid and designed to protect the CD from damage, like scratches, exposure to heat, sunlight, etc. We will look at the various types in turn, starting with the most common.

A jewel CD case

A jewel case is a compact disc case which has been used since the CD was first released in 1982. It is a three-piece plastic case, measuring 142 by 125 by 10 millimetres (5.59 in × 4.92 in × 0.39 in), a volume of 177.5 cubic centimetres (10.83 cu in), which usually contains a CD along with the liner notes and a back card. Two opposing transparent halves are hinged together to form the casing, the back half holding a media tray that grips the disc by its hole. All three parts are made of injection-moulded polystyrene.

I.M.I.T.K.



A ‘black side’ slimcase designed to hold a blank recordable CD.

Around 1993 there was a general shift to the rear jewel case being made of clear plastic instead of black or coloured (as above). I have many of these, and when you buy a blank, recordable CD, they tend to have the plain black rear.

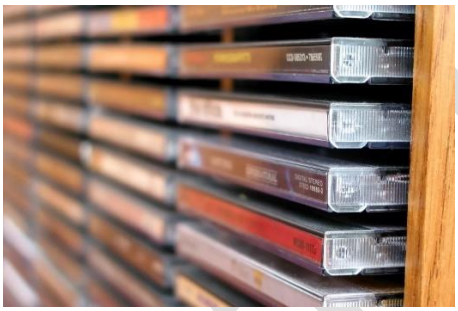
The front lid contains two, four, or six tabs to keep any liner notes in place. Typically, notes will be a 120 by 120 millimetres (4.7 in × 4.7 in) booklet, or a single 242 by 120 millimetres (9.5 in × 4.7 in) leaf folded in half. In addition, there is usually a back card, 150 by 118 millimetres (5.9 in × 4.6 in), underneath the media tray and visible through the clear back, often listing the track names, studio, copyright data and other information. The back card is folded into a flattened ‘U’ shape, the sides being visible along the ends (often referred to as the spine) of the case. The ends usually have the name of the release and the artist, and often label or catalogue information printed on them, and are designed to be visible when the case is stored vertically, ‘book-style,’ on shelves.

The rear media tray snaps into the back cover and is responsible for securing the CD. This is achieved by a central circular hub of spring-loaded teeth that grip and effectively suspend the disc above the tray surface, preventing the recording surface from being scratched. That is because the hub is slightly raised above the surface of the rest of the tray. Yet the teeth are liable to break. I have had many instances where I have had to pull the disc out quite forcibly and the teeth have snapped, rendering the case useless for future storage. Also, the lid is held in place by a couple of small arms which are also liable to break. If you should accidentally drop the case, it is usually the lid that breaks off as the arms have snapped. (See Weaknesses below.)

The jewel case is the standard used by most manufacturers. It is the most common type of case. In fact, around 80 to 90 percent of CDs will be found in a jewel case.

Strengths

The jewel case has a tight and firm grip of the CD because of the tray's 'teeth' or 'lock.' Because of this, even if the jewel case is turned upside-down, left, or right, the CD is held in place. Flimsier cases may cause the CD to become loose, or even fall out. Also, since the jewel case is made of plastic, it is sturdier compared to cardboard, paper, or foams. When pressure is applied to the CD jewel case, the case will break first before the CD. If the case is made of thin cardboard, there is a greater chance that the CD would break or get damaged because the weight is directed onto it.



A specially designed rack to hold CDs in standard jewel cases.

The type of material of the CD jewel case allows storage of CDs for decades without ruining the CDs. The same is not as true with other cases, since paper can stick to the CDs due to air, humidity, and other factors. The CD jewel case may also be preferred because it offers orderliness on a shelf. Since the CD jewel case has existed for decades, there are many CD shelves, racks, and other products in the market that are made for CD jewel cases.

The CD jewel case is designed to carry a booklet, as well as to have panel inserts. These may be used to display album artwork, lyrics, photos, messages, biography, etc.

Because the CD jewel case is the standard, most-commonly used CD case, it is much cheaper. The price of the CD jewel case usually ranges from 60 to 80 pence. That is a few pennies cheaper than digipaks and other CD wallets. However, if large quantities of cases are needed, the price difference may be hundreds or thousands of pounds.

Weaknesses

There are several shortcomings with the jewel case. The case is hinged on two brittle plastic arms, which often break if the case receives shock or stress due to being dropped. The teeth of the hub holding the disc are also prone to failure by snapping. There is a problem with the tabs ('half-moons') which hold the liner notes in place; sometimes, especially with larger booklets, the tabs grip the booklet too tightly, leading to tearing or creasing. When replacing the booklet, it can get snagged and crumple or rip. As noted above, some CD releases have only two tabs, which allows the booklet to be more easily removed and replaced (with the disadvantage of the booklet

sometimes falling out if held the wrong way). Replacement jewel cases can be purchased to replace any that have broken plastic arms or hub teeth, which can be nuisance.

Variations

Jewel case types: 1: Original jewel case, 2: CD-single jewel case and 3: Slimline jewel case.

Double disc albums can either be packaged in standard-thickness jewel cases with hinged media trays which can be lifted to reveal the second disc (trays hinged on the left are known as 'Smart Tray' format; those hinged on the right are known as 'Brilliant Box' format) or in a chubby jewel case, sometimes called a multi-CD jewel case, which is slightly thicker than two normal jewel cases stacked on top of each other and can hold from 2 to 6 CDs. Chubby jewel cases do not fit in CD racks like the one pictured above.

Jewel cases for CDs released early in the format's life featured frosted top and bottom spines as opposed to the ridged ones more commonly used. As a result of their rarity, these types of jewel cases are fairly coveted among collectors.

'Super Jewel Box' is a more advanced design which offers amongst other improvements a greatly strengthened hinge area. The depth of the disc tray is also greater, allowing for two discs to be placed on top of each other. The super jewel box cannot be used as a direct replacement for the older jewel case design as its card insert for the back is slightly different in size and shape. The super jewel box was developed by Philips and it was intended to be successor to the original jewel case. Some CD manufacturers (for example the high-end company Linn) are supplying them. The super jewel box is the conventional case for Super Audio CD (SACD) releases.

Many alternatives to the standard jewel case may also be found, including larger DVD-style cases with a more book-like shape. It is not uncommon to find CDs housed in custom cases, tins and boxes of varying shapes and sizes. Slipcases and other envelope-type designs are also occasionally used.

Some DualDiscs are packaged in jewel cases of a somewhat different design from the CD version; the inside edge is rounded instead of flat, and the physical position of the disc is moved slightly

toward the spine to make room for a latch mechanism. The overall dimensions of a DualDisc case are roughly the same as a standard CD case. However, the hinge mechanism is smaller and cannot be dismantled as easily as on a standard jewel case.

Smaller jewel cases are used for 8 cm CD; similar cases without the hub are used for MiniDisc and (magnetic) Zip disk media.

Slimline jewel case

Slimline jewel cases (see above pic, no. 3) first became popular for CD singles sold in Japan and Europe and have become a common space-saving packaging for burned CDs. The cases used for CD singles sold in Japan and Europe are 7 mm thick, with a 'J-card' type inlay, showing cover art through the front of the case, and also through both the spine and part of the back of the case. The CD itself is usually inserted 'upside-down' in the case, so that the artwork on the disc itself shows through the transparent back of the case.

Most slim jewel cases sold for burned CDs use the measure 142 by 125 by 5 millimetres (5.59 in × 4.92 in × 0.20 in), which is roughly half the thickness of a standard CD jewel case, allowing twice as many CDs to be stored in the same space, and will generally fit two to a slot in a standard CD rack (see above pic). They generally do not have room for a full package insert booklet, only a slip of paper for a track listing or cover art, showing only through the front of the case. Unlike the standard jewel cases, slimline cases are made of two pieces rather than three and do not have a place for a back label. However, with this design the 'spine' is narrower, making it difficult to read the spine, therefore harder to identify when stored edgeways on a shelf.

External marketing packaging

In the U.S. and Canada, the jewel box of a music CD was originally packaged for retail sale in a large cardboard box called a longbox in order to fit in store fixtures designed for vinyl records, offer larger space for display of artwork and marketing blurbs, and deter shoplifting. This packaging was much-criticized as environmentally wasteful and was eventually dropped by most retailers in the mid-1990s.

Around 1994, the top wrap-around label sticker began to appear on most CDs, to make it easier to read what each CD was from the top without having to flip through them to see the front cover. These stickers were usually nothing more than informational labels and rarely would have any use in the marketing of the album. The wrap-around sticker also provided an extra seal, possibly as another theft deterrent. I preferred these as it made it quicker to shop around. Imagine you are in a record store going through the thousands of CDs available in racks placed horizontally; how much easier it is to just read the label rather having to take the CD in case out to identify the product.

A chiefly Japanese packaging addition is the inclusion of an obi strip, a J-card-esque paperboard slip wound around the left side of the case to show details such as the price, artist, etc.

Paper or Tyvek sleeve

The simplest, least expensive package is a paper envelope. More expensive versions add a transparent window to the envelope allowing the disc label to be seen. The envelope can also be made from spunbonded polyethylene (trade-named Tyvek). This is both more durable and less abrasive than paper. However, such packaging is rare for commercial releases due to its relative lack of protection compared with other designs; it is mainly limited to promotional and demo discs.

Q Pack

The Q Pack was developed by the Queens Group Inc. in the mid-1990s as an alternative to regular CD jewel cases. The Q Pack does not have a snap-in tray like a regular jewel case. It is characterized by the corrugated raised area where the top hinges to the back. Since Q Pack cases are not transparent, generally cover art is applied as a decal to the cover. Decals can also be applied to the inside front, on the tray underneath the hub and the back cover. A slot for an insert booklet is found inside the front cover as on typical jewel cases.

Digipa(c)k

A digipak (or digipack) is a rectangular cardboard package with one or more plastic trays capable of holding a disc attached to the inside. There are variations where the disc(s) sit on a hub or spindle inside and come in various sizes. A digipak-style case is a common alternative to the somewhat brittle jewel case. Although they are less vulnerable to cracking than a jewel case, the disc tray inside the package is still made of the same brittle plastic so it is prone to cracking and the teeth of the tray hub breaking if the package is crushed or suddenly jolted.

FLPpak

Similar in concept to Digipak, an FLPpak consists of a wrap-around outer shell made of cardboard, bonded to a plastic CD tray. However, FLPpak differs in two significant ways:

First, while Digipak cases extend their cardboard shells taller than their trays to keep the tray as hidden as possible when closed, FLPpak packages extend their trays beyond the cardboard and incorporate top and bottom edges, sacrificing aesthetic flexibility for increased protection from shelf wear. (These end-caps are extended far enough that, when laying on a flat surface, the plastic top and bottom edges will suspend the front or back above it.)

Second, by incorporating a latching closure into the right edge of the tray, avoiding the need for an extra component such as a slipcover to keep the package from coming open.

Digisleeve

A digisleeve consists of a rectangular cardboard package which differs from a digipak/digipack in that it does not have a tray, spindle or hub; the disc(s) slide into an outside pocket of the packaging.

Digifile

A digifile consists of a rectangular cardboard package similar to a digisleeve except that the disc(s) slide vertically (and in some cases diagonally) into a horizontal or diagonal slot of the packaging.

Wallet

A wallet consists of a rectangular cardboard package that is like a digisleeve except that the disc or discs slide horizontally into a vertical slot inside the packaging.

Mini-LP sleeve/paper sleeve

A mini-LP sleeve/paper sleeve is a square cardboard package that looks like a miniaturized version of an LP jacket. The disc usually slides into an inner sleeve whose opening need not match the outer sleeve in the manner of actual LPs. Mini-LP sleeves can either appear as single or gatefold, identically to full-sized LP jackets, with both variants being used for several music releases.

While used in a somewhat limited capacity in the west, where the jewel case remains the most popular form of CD packaging, mini-LP sleeves are common for reissues of older albums in Japan, with their typically high level of faithfulness to the original vinyl record packaging making them sought-after among collectors.

The downside to this format is that the disc can be easily scratched each time it is taken out for play; a more serious issue can also be that if the glue that keeps the sleeve that holds the CD closed on the side closest to the spine (on gatefold covers) weakens, it can get onto the CD, rendering it unplayable. For these reasons, mini-LP releases— particularly Japanese ones— enclose the CD in a protective sleeve made from matted plastic or rice paper. Another disadvantage with mini-LP sleeves is that, like digipaks, they are significantly more vulnerable to wear, and other forms of damage compared to standard jewel cases and are more difficult to replace.

One advantage of mini-LP sleeves is that album covers that were originally textured, such as *Back in Black* by AC/DC or *Fear of Music* by Talking Heads, can retain the texturing on the CD release, as well as being able to replicate other nuances of the vinyl packaging such as unusually shaped packaging or artwork intended to span the whole of a gatefold (Pink Floyd's *Dark Side of the Moon*, being a good example). In addition, the packaging is more environmentally friendly due to the use of more easily recyclable and biodegradable cardboard (as opposed to the polystyrene used

in jewel cases) and is significantly cheaper to produce than both jewel cases and digipaks, which has made them a more favourable option in markets where CD sales are declining.

Minipack

A minipack is a square cardboard package in which the disc sits on a spindle, hub or tray. In essence, it's a combination of a digipak and mini-LP sleeve. This type of packaging is usually hand-made and is not seen very often.

JakeBox

JakeBox is a paperboard packaging concept designed in Sweden, featuring a pop-up 'claw.' The claw releases the CD when the cover is opened and locks it again when the cover is closed. This design makes the disc easily accessible and protects the CD once the case is closed.

Discbox slider

The discbox slider (also called DBS) is a disc packaging concept in 100% carton board. The DBS is comparable with plastic jewel or amaray cases when it comes to size but holds more of the features of the LP style cases in terms of light weight and printability. The DBS case opens from the side by moving the slider part (on which the disc is resting) from the sleeve. The discbox slider is 100% recyclable. Many covermount CDs released in British magazine *Mixmag* used to be packaged in a discbox slider, after replacing a standard jewel box, although the discbox slider itself was replaced by a simple cardboard sleeve.

Compac Plus

The Compac Plus (or Compact Plus) is a disc packaging which is similar in style to a digipak. However, it consists of two plastic CD trays which 'clip' together like a normal slipcase. The packaging was introduced in the early 1990s. It was originally a brand which had their own logo, and was used by bands such as Blur, but as years progressed, many other artists started to use their own version of the packaging.

Lift-lock case

Lastly, many gold CDs, including those from Mobile Fidelity, are packaged in lift-lock cases, a special type of case where the CD is lifted out of the case automatically and a latch unlocked when opened. The advantage of this design is that only the edges of the disc are handled when removing it from the case, and the disc is never subjected to any bending force while being removed. From the outside, they appear almost identical to a standard jewel case. They have the same dimensions as a standard jewel case and use standard booklets and back cards.

Appendix 2

USB Memory Sticks and Flash Drives

Brief Remarks

The world's highest capacity flash drive can hold up to a terabyte of data—but how can you fit all that information into a box the size of your thumb?

The chip inside contains a grid of transistors acting like tiny switches. All data is reduced to binary 1s and 0s and one of these values is stored at each point in the memory. To store a '1', the transistor in the relevant location is switched on, allowing charge to flow through it. The transistors stay in their on or off states even with no power, so the data stays intact even when you disconnect your memory stick.

USB drives use Flash memory, which means the ones and zeros of data are stored on transistors. When data is saved, a binary zero is set by charging the float gate of the transistor, and a binary one is set by removing the charge.

But how long do they last? The lifespan of data on a USB flash drive depends on many factors: Under ideal conditions, data should remain preserved on a high-quality USB stick for at least 10 years or even longer.

A flash drive stores data using flash memory. Flash memory uses an electrically erasable programmable read-only (EEPROM) format to store and retrieve data. Flash drives operate in a similar fashion as conventional hard drives. Flash drives are non-volatile, which means they do not need a battery backup. Computer users may choose to use flash memory as an option for the easy storage and transfer of data.

Most computers come equipped with USB ports, which detect inserted flash drives and install the necessary drivers to make the data retrievable. Computer users can store and retrieve data once the operating system has detected a connection to the USB port. After the computer user has finished using the flash drive, he or she must then properly eject the device to safely remove it. The operating system prompts the user when it is safe to remove the flash drive from the USB port.

A flash drive has many components that make it operational. For instance, it has a printed circuit board (PCB) covered in a durable casing made of plastic or rubber. A USB connector protrudes from one end of the flash drive. Computer users connect this side of the flash drive to the USB

port receptacle. Most flash drives come equipped with a type-A USB connection to make them compatible with standard receptacles.

Flash drives have a USB mass storage device classification, which means they do not require additional drivers. The computer's operating system recognizes a block-structured logical unit, which means it can use any file system or block addressing system to read the information on the flash drive. A flash drive enters emulation mode, or acts a hard drive, once it has connected to the USB port. This makes it easier to transfer data between the flash drive and the computer.

Flash drives are commonly used to operate lightweight operating systems, which may be used to turn personal computers (PCs) into networking devices. In these cases, the flash drive contains the operating system for booting purposes. Flash drives have an added advantage over CDs and floppy disks, which have also been used to boot operating systems. For instance, their low-power consumption and low failure rates make them suitable for networking. In addition, flash drives are smaller in size and more portable than their counterparts. They also do not require special training to use. Lastly, they have larger memory capacity than CDs and floppy disks.

Fuller Details

A flash drive (also thumb drive [US], memory stick [UK], and pen drive elsewhere) is a data storage device that includes flash memory with an integrated USB interface. A typical USB drive is removable, rewritable, and smaller than an optical disc, and usually weighs less than 30 g (1 oz). Since first offered for sale in late 2000, the storage capacities of USB drives range from 8 to 256 gigabytes (GB), 512 GB and 1 terabyte (TB). As of 2023, 2 TB flash drives were the largest currently in production. Some allow up to 100,000 write/erase cycles, depending on the exact type of memory chip used, and are thought to physically last between 10 and 100 years under normal circumstances (shelf storage time).

Common uses of USB flash drives are for storage, supplementary back-ups, and transferring of computer files. Compared with floppy disks or CDs, they are smaller, faster, have significantly more capacity, and are more durable due to a lack of moving parts. Additionally, they are less vulnerable to electromagnetic interference than floppy disks and are unharmed by surface scratches (unlike CDs). However, as with any flash storage, data loss from bit leaking due to prolonged lack of electrical power and the possibility of spontaneous controller failure due to poor manufacturing could make it unsuitable for long-term archiving of data. The ability to retain data is affected by the controller's firmware, internal data redundancy, and error correction algorithms.

USB flash drives use the USB mass storage device class standard, supported natively by modern operating systems such as Windows, Linux, macOS and other Unix-like systems, as well as many BIOS boot ROMs. USB drives with USB 2.0 support can store more data and transfer faster than much larger optical disc drives like CD-RW or DVD-RW drives and can be read by many other

systems such as the Xbox One, PlayStation 4, DVD players, automobile entertainment systems, and in a number of handheld devices such as smartphones and tablet computers, though the electronically similar SD card is better suited for those devices, due to their standardized form factor, which allows the card to be housed inside a device without protruding.

A flash drive consists of a small, printed circuit board carrying the circuit elements and a USB connector, insulated electrically and protected inside a plastic, metal, or rubberized case, which can be carried in a pocket or on a key chain, for example. Some are equipped with an I/O indication LED that lights up or blinks upon access. The USB connector may be protected by a removable cap or by retracting into the body of the drive, although it is not likely to be damaged if unprotected. Most flash drives use a standard type-A USB connection allowing connection with a port on a personal computer but drives for other interfaces also exist (e.g. micro-USB and USB-C ports). USB flash drives draw power from the computer via the USB connection. Some devices combine the functionality of a portable media player with USB flash storage; they require a battery only when used to play music on the go.

The basis for USB flash drives is flash memory, a type of floating-gate semiconductor memory invented by Fujio Masuoka in the early 1980s. Flash memory uses floating-gate MOSFET transistors as memory cells.

Flash drives are often measured by the rate at which they transfer data. Transfer rates may be given in megabytes per second (MB/s), megabits per second (Mbit/s), or in optical drive multipliers such as '180X' (180 times 150 KiB/s). File transfer rates vary considerably among devices. Second generation flash drives have claimed to read at up to 30 MB/s and write at about half that rate, which was about 20 times faster than the theoretical transfer rate achievable by the previous model, USB 1.1, which is limited to 12 Mbit/s (1.5 MB/s) with accounted overhead. The effective transfer rate of a device is significantly affected by the data access pattern.

By 2002, USB flash drives had USB 2.0 connectivity, which has 480 Mbit/s as the transfer rate upper bound; after accounting for the protocol overhead that translates to a 35 MB/s effective throughput.

By 2010, the maximum available storage capacity for the devices had reached upwards of 128 GB. USB 3.0 was slow to appear in laptops. Through 2010, the majority of laptop models still contained only USB 2.0.

In January 2013, tech company Kingston, released a flash drive with 1 TB of storage. The first USB 3.1 type-C flash drives, with read/write speeds of around 530 MB/s, were announced in March 2015. By July 2016, flash drives with 8 to 256 GB capacity were sold more frequently than those with capacities between 512 GB and 1 TB. In 2017, Kingston Technology announced the

release of a 2-TB flash drive. In 2018, SanDisk announced a 1TB USB-C flash drive, the smallest of its kind.

On a USB flash drive, one end of the device is fitted with a single Standard-A USB plug; some flash drives additionally offer a micro-USB or USB-C plug, facilitating data transfers between different devices.

Inside the casing is a small-printed circuit board, which has some power circuitry and a small number of surface-mounted integrated circuits (ICs). Typically, one of these ICs provides an interface between the USB connector and the onboard memory, while the other is the flash memory. Drives typically use the USB mass storage device class to communicate with the host.

Flash memory combines a number of older technologies, with lower cost, lower power consumption and small size made possible by advances in semiconductor device fabrication technology. The memory storage is based on earlier EPROM and EEPROM technologies. These had limited capacity, were slow for both reading and writing, required complex high-voltage drive circuitry, and could be re-written only after erasing the entire contents of the chip.

Hardware designers later developed EEPROMs with the erasure region broken up into smaller “fields” that could be erased individually without affecting the others. Altering the contents of a particular memory location involved copying the entire field into an off-chip buffer memory, erasing the field, modifying the data as required in the buffer, and re-writing it into the same field. This required considerable computer support, and PC-based EEPROM flash memory systems often carried their own dedicated microprocessor system. Flash drives are more or less a miniaturised version of this.

The development of high-speed serial data interfaces such as USB made semiconductor memory systems with serially accessed storage viable, and the simultaneous development of small, high-speed, low-power microprocessor systems allowed this to be incorporated into extremely compact systems. Serial access requires far fewer electrical connections for the memory chips than parallel access, simplifying the manufacture of multi-gigabyte drives.

Computers access modern flash memory systems very much like hard drives, where the controller system has full control over where information is actually stored. The actual EEPROM writing and erasure processes are, however, still very similar to the earlier systems described above.

Many low-cost MP3 players simply add extra software and a battery to a standard flash memory control microprocessor so it can also serve as a music playback decoder. Most of these players can also be used as a conventional flash drive, for storing files of any type.

USB plug–provides a physical interface to the host computer. Some USB flash drives use USB plug that does not protect the contacts, with the possibility of plugging it into the USB port in the wrong orientation if the connector type is not symmetrical.

The parts of a USB are: mass storage controller–a small microcontroller with a small amount of on-chip ROM and RAM; NAND flash memory chip(s)–stores data (NAND flash is typically also used in digital cameras); Crystal oscillator–produces the device's main clock signal and controls the device's data output through a phase-locked loop; Cover–typically made of plastic or metal, protecting the electronics against mechanical stress and even possible short circuits; they may also contain LEDs to indicate data transfers or data reads and writes.

Other optional parts are: unpopulated space–provides space to include a second memory chip. Having this second space allows the manufacturer to use a single printed circuit board for more than one storage size device; USB connector cover or cap–reduces the risk of damage, prevents the entry of dirt or other contaminants, and improves overall device appearance. Some flash drives use retractable USB connectors instead. Others have a swivel arrangement so that the connector can be protected without removing anything; Transport aid–the cap or the body often contains a hole suitable for connection to a key chain or lanyard. Connecting the cap, rather than the body, can allow the drive itself to be lost.

Most USB flash drives weigh less than 30 g (1 oz). While some manufacturers are competing for the smallest size, with the biggest memory, offering drives only a few millimetres larger than the USB plug itself, some manufacturers differentiate their products by using elaborate housings, which are often bulky and make the drive difficult to connect to the USB port. Because the USB port connectors on a computer housing are often closely spaced, plugging a flash drive into a USB port may block an adjacent port. Such devices may carry the USB logo only if sold with a separate extension cable. Such cables are USB-compatible but do not conform to the USB standard.

USB flash drives have been integrated into other commonly carried items, such as watches, pens, laser pointers, and even the Swiss Army Knife; others have been fitted with novelty cases such as toy cars or Lego bricks. USB flash drives with images of dragons, cats or aliens are very popular in Asia. The small size, robustness and cheapness of USB flash drives make them an increasingly popular peripheral for case modding.

Most flash drives ship preformatted with the FAT32, or exFAT file systems. The ubiquity of the FAT32 file system allows the drive to be accessed on virtually any host device with USB support. Also, standard FAT maintenance utilities (e.g., ScanDisk) can be used to repair or retrieve corrupted data. However, because a flash drive appears as a USB-connected hard drive to the host system, the drive can be reformatted to any file system supported by the host operating system.

Sectors are 512 bytes long, for compatibility with hard disk drives, and the first sector can contain a master boot record and a partition table. Therefore, USB flash units can be partitioned just like hard disk drives.

The memory in flash drives was commonly engineered with multi-level cell (MLC) based memory that is good for around 3,000-5,000 program-erase cycles. Nowadays Triple-level Cell (TLC) is also often used, which has up to 500 write cycles per physical sector, while some high-end flash drives have single-level cell (SLC) based memory that is good for around 30,000 writes. There is virtually no limit to the number of reads from such flash memory, so a well-worn USB drive may be write-protected to help ensure the life of individual cells.

Estimation of flash memory endurance is a challenging subject that depends on the SLC/MLC/ TLC memory type, size of the flash memory chips, and actual usage pattern. As a result, a USB flash drive can last from a few days to several hundred years.

Regardless of the endurance of the memory itself, the USB connector hardware is specified to withstand only around 1,500 insert-removal cycles.

Transfer speeds are technically determined by the slowest of three factors: the USB version used, the speed in which the USB controller device can read and write data onto the flash memory, and the speed of the hardware bus, especially in the case of add-on USB ports.

USB flash drives usually specify their read and write speeds in megabytes per second (MB/s); read speed is usually faster. These speeds are for optimal conditions; real-world speeds are usually slower. In particular circumstances that often lead to speeds much lower than advertised are transfer (particularly writing) of many small files rather than a few very large ones, and mixed reading and writing to the same device.

In a typical well-conducted review of a number of high-performance USB 3.0 drives, a drive that could read large files at 68 MB/s and write at 46 MB/s, could only manage 14 MB/s and 0.3 MB/s with many small files. When combining streaming reads and writes the speed of another drive, the drive could read at 92 MB/s and write at 70 MB/s, was 8 MB/s. These differences differ radically from one drive to another; some could write small files 10% faster than for large ones. The examples given are chosen to illustrate extremes.

The most common use of flash drives is to transport and store personal files, such as documents, pictures and videos. Individuals also store medical information on flash drives for emergencies and disaster preparation.

Original flash memory designs had very limited estimated lifetimes. The failure mechanism for flash memory cells is analogous to a metal fatigue mode; the device fails by refusing to write new

data to specific cells that have been subject to many read-write cycles over the device's lifetime. Premature failure of a 'live USB' could be circumvented by using a flash drive with a write-lock switch as a WORM device, identical to a live CD. Originally, this potential failure mode limited the use of 'live USB' system to special-purpose applications or temporary tasks.

As of 2011, newer flash memory designs have higher estimated lifetimes. Several manufacturers are now offering warranties of 5 years or more. Such warranties should make the device more attractive for more applications. By reducing the probability of the device's premature failure, flash memory devices can now be considered for use where a magnetic disk would normally have been required. Flash drives have also experienced an exponential growth in their storage capacity over time (following the Moore's Law growth curve). As of 2013, single-packaged devices with capacities of 1 TB are readily available, and devices with 16 GB capacity are very economical. Storage capacities in this range have traditionally been considered to offer adequate space, because they allow enough space for both the OS software and some free space for the user's data.

Audio players: Many companies make small solid-state digital audio players, essentially producing flash drives with sound output and a simple user interface. Examples include the Creative MuVo, Philips GoGear and the first-generation iPod shuffle. Some of these players are true USB flash drives as well as music players; others do not support general-purpose data storage. Other applications requiring storage, such as digital voice or sound recording, can also be combined with flash drive functionality.

Many of the smallest players are powered by a permanently fitted rechargeable battery, charged from the USB interface. Fancier devices that function as a digital audio player have a USB host port (type A female typically).

Digital audio files can be transported from one computer to another like any other file and played on a compatible media player (with caveats for DRM-locked files). In addition, many home Hi-Fi and car stereo head units are now equipped with a USB port. This allows a USB flash drive containing media files in a variety of formats to be played directly on devices which support the format. Some LCD monitors for consumer HDTV viewing have a dedicated USB port through which music and video files can also be played without use of a personal computer.

Artists have sold or given away USB flash drives, with the first instance believed to be in 2004 when the German punk band Wizo released the *Stick EP*, only as a USB drive. In addition to five high-bitrate MP3s, it also included a video, pictures, lyrics, and guitar tablature. Subsequently, artists including Nine Inch Nails and Kylie Minogue have released music and promotional material on USB flash drives. The first USB album to be released in the UK was *Kiss Does... Rave*, a compilation album released by the Kiss Network in April 2007.

Flash drives use little power, have no fragile moving parts, and for most capacities are small and light. Data stored on flash drives is impervious to mechanical shock, magnetic fields, scratches and dust. These properties make them suitable for transporting data from place to place and keeping the data readily at hand.

Flash drives also store data densely compared to many removable media. In mid-2009, 256 GB drives became available, with the ability to hold many times more data than a DVD (54 DVDs) or even a Blu-ray (10 BDs).

Flash drives implement the USB mass storage device class so that most modern operating systems can read and write to them without installing device drivers. The flash drives present a simple block-structured logical unit to the host operating system, hiding the individual complex implementation details of the various underlying flash memory devices. The operating system can use any file system or block addressing scheme. Some computers can boot up from flash drives.

Specially manufactured flash drives are available that have a tough rubber or metal casing designed to be waterproof and virtually 'unbreakable'. These flash drives retain their memory after being submerged in water, and even through a machine wash. Leaving such a flash drive out to dry completely before allowing current to run through it has been known to result in a working drive with no future problems. Channel Five's Gadget Show cooked one of these flash drives with propane, froze it with dry ice, submerged it in various acidic liquids, ran over it with a jeep and fired it against a wall with a mortar. A company specializing in recovering lost data from computer drives managed to recover all the data on the drive. All data on the other removable storage devices tested, using optical or magnetic technologies, were destroyed.

Most USB flash drives do not include a write protection mechanism. This feature, which gradually became less common, consists of a switch on the housing of the drive itself, that prevents the host computer from writing or modifying data on the drive.

A drawback to the small physical size of flash drives is that they are easily misplaced or otherwise lost. This is a particular problem if they contain sensitive data. As a consequence, some manufacturers have added encryption hardware to their drives, although software encryption systems which can be used in conjunction with any mass storage medium will achieve the same result. Most drives can be attached to keychains or lanyards. The USB plug is usually retractable or fitted with a removable protective cap. Semiconductor corporations have worked to reduce the cost of the components in a flash drive by integrating various flash drive functions in a single chip, thereby reducing the part-count and overall package-cost.

Flash drive capacities on the market increase continually. High speed has become a standard for modern flash drives. Capacities exceeding 256 GB were available on the market as early as 2009.

GLOSSARY

AM/FM–The two signals used for transmitting radio broadcasts. AM (amplitude modulation) and FM (frequency modulation) are types of modulation (coding). The sound of the program material coming from a radio studio is used to modulate (vary) a carrier wave of a specific frequency, then broadcast it. Tuners pick up this signal and turn it into sound. See **Tuner**.

Amplifier–An electronic device for increasing the amplitude of electrical signals, i.e. the voltage, current, or power of the signals, and is used chiefly in sound reproduction. Amplifiers need to be connected to **Speakers** or other audio output devices for the sound to be heard.

Analog–The old type of signal that was transmitted using waves. Compare with **Digital**.

Audio Player–The device used to play **Audio Sticks** in the **Rack System**.

Audio Stick–Essentially a memory stick that carries prerecorded music but differs from a memory stick in that it does not use **USB**. It has its own unique interface with the **Audio Player** in the **Rack System**.

Audiophile–From the Greek, 'sound lover,' it has now come to mean anyone who is enthusiastic about high-fidelity sound reproduction, or sound that's recorded or reproduced with very little distortion. Here we use the term to generally mean someone who appreciates the good quality of sound reproduction in relation to music and is interested in further developments along those lines, rather than someone who is not just content owning the latest music gadgets but also needs to know how and why they work.

AUX–Auxiliary, a type of standard communications port on a device that accommodates audio signals for: MP3 players, headphones, headsets, microphones, speakers, etc.

AVI–Audio Video Interleave. A multimedia container format from Microsoft that has been widely used for video playback in the Windows world. AVI was the first A/V format for Windows.

Base Unit–The bottom part of the **Rack System** which sits on the floor and transmits data from the attached rack to the **Audio Player** which interprets it in audio/video form.

Cartridge–Turntable cartridges (or phono cartridges or pickups) are mounted onto the end of the tonearm of your record player. The cartridge includes the **Stylus** (needle) that lowers onto the **Vinyl** to read the records' modulations and plays them. See also **Turntable**.

Compact Disc–Shortened to CD, the digital format for playing music on a portable storage medium. It can play/record, and store other data, in digital form, or either as audio or video.

Consumer Electronics Show (CES)–The world's most powerful tech event where companies display their newest inventions and products for promotion. This year it was held in Las Vegas in January. It is the sort of show where such things as the Rack System would be unveiled.

Digital–The modern method of transmitting a signal using binary code, as in 0s, 1s, in varying combinations. Compare with **Analog**.

DSD–Direct Stream Digital. It is a high-resolution format that produces a high-resolution signal in a different way to that employed by the PCM system that can be transmitted as WAV, **FLAC**, ALAC or AIFF files.

HDMI–High-Definition Multimedia Interface, a standard for simultaneously transmitting digital video and audio from a source, such as a computer or TV cable box, to a computer monitor, TV or projector.

FLAC–Free Lossless Audio Codec, a digital audio format that offers compressed lossless files, which means it can reduce the audio file's size without losing any of its original quality, virtually the opposite of **MP3** (which see).

Genre–The categorisation of various types of music, dependent on the sound, the style, and even the visual appearance of the band, singer, or musician, with much overlapping, so there are cross-genres, like Punkabilly, i.e. Rockabilly fused with Punk.
Graphic Equaliser–Or EQ is an audio controller that can be found either fitted to music centres or sold separately as part of hi-fi equipment and offers a simple solution: boost or cut (make louder or softer) a specific range of frequencies to improve sound quality to one's personal preference.
Hi-Fi–High Fidelity. Now taken in a general sense to mean equipment for reproducing sound to the highest fidelity so that it is free from distortion and imperfection.
High-Res–High-Resolution Audio is an audio format that sounds great and allows you to pick up on the subtle details and nuances you'd hear in the recording studio. Unlike **CD**s and **MP3** music formats, Hi-Res audio contains a higher sampling frequency and bitrate, and therefore larger files. An **Audio Stick** can accommodate High-Res audio because it has the capacity to store much larger data than any other media.
LED–Light-Emitting Diode. A semiconductor diode which glows when a voltage is applied.
Lossless and Lossy Compression–There are two methods of compression: lossy and lossless. Lossy reduces file size by permanently removing some of the original data. Lossless reduces file size by removing unnecessary metadata.
Loudspeakers–see **Speakers**.
Media Player–Any device designed to playback video or audio files, such as films and music, in various formats, i.e. **MP4**, **MP3**, **AVI**, etc., which see.
MP3–MPEG-1 Audio Layer 3, is a method to compress and store audio. An MP3 file can compress a music file by up to 95% of its original CD-quality size while maintaining good enough audio quality.
MP4–MPEG-4, is a digital multimedia container format most commonly used to store video and audio, but it can also be used to store other data such as subtitles and still images. Like most modern container formats, it allows streaming over the Internet.
Original Analog Source–The type of signal the original source appeared in before being converted into another format, i.e. digital. For example, the tracks on a **Vinyl** record are recorded in the analog format but can be converted to a digital format like **MP3** using a decoder.
Rack System–Essentially an electronic shelving system for storing **Audio Sticks** which when pressed into the slots of the rack start to play. The Rack carries signals to the **Audio Player** which interprets it as video and audio.
Record Producer–A record producer is a music recording project's overall supervisor whose responsibilities may involve a range of creative and technical roles, including controlling the recording session, advising, and guiding musicians, organising and scheduling production budgets and resources, and supervising the output of the recording with a team behind him, e.g. a **Sound Engineer**, which see.
Sound Engineer–A technician dealing with acoustics for a broadcast or musical performance who specialises in altering and balancing the levels of sound using a mixing desk. See also **Record Producer**.
Speakers–The output of record sound is amplified through an **Amp** and is sent to the speaker. This electrical current is what is utilised to produce sound. When electrical current transforms, it forms a magnetic field. To make the speakers' cone vibrate, built-in magnets are included to produce a magnetic field in opposition to the electrical current's magnetic field.
SSD–Solid-State Drive is a semiconductor-based storage device, which typically uses NAND flash memory to save persistent data.

Stylus–The needle found in the **Cartridge** of a **Tonearm** on a **Turntable**. It is the stylus that reads a **Vinyl** records' modulations and plays them. See also **Cartridge**.
Subwoofer–A loudspeaker designed to reproduce low-pitched audio frequencies, such as bass, sub-bass, which are lower in frequency than those which can be optimally generated by a **Woofer**.
Tonearm–The movable arm found on a **Turntable** supporting the pickup or **Stylus**.
Tuner–A radio receiver designed to pick up signals in either **AM/FM** form.
Turntable–The deck designed to play **Vinyl** records, usually belt driven, with a **Tonearm** fitted with a **Cartridge** and a **Stylus** to pick up information from the grooves of the record as it spins, either at 33rpm or 45rpm. Other speeds like 16 and 78 are now obsolete.
Tweeter–A **Speaker** designed to reproduce high frequencies and emit the 'upper' range of sounds used for reproducing music and speech called 'trebles' which **Woofers** and **Subwoofers** cannot produce.
USB–Universal Serial Bus is a standard that mentions the specifications used by cables, ports, and protocols that enable simple and universally accepted connectivity between a host and peripheral devices such as external hard-drives, smart phones, etc. It can also be used for charging devices, like phones, watches, lights, torches, etc.
Vinyl–Synonymous with a gramophone or phonograph record. It is an **Analog** sound storage medium in the form of a flat disc with an inscribed, modulated spiral groove on both sides and can be played at 3 speeds; 33, 45, or 78rpm, although the latter is now obsolete. It can refer to a Long Play (LP) that may contain several tracks, of twelve inches in diameter, or Extended Play (EP), which may contain anywhere from two to six tracks, either of the 12" or 7" formats. It can also refer to a single, 7", that usually plays at 45rpm, with one track on either side, although there maybe variations, like a 7" single that plays at 33rpm as it holds more information than an ordinary single. There is also the 10" single which has largely been discontinued. Lastly, usually the colour is black, as in shellac, but there have been popular trends of having specially coloured vinyl other than black, also picture discs, some of which may not be circular in shape, but maybe in the shape of the picture they represent. Vinyl has now made a significant comeback and is usually pressed on heavier vinyl, often weighing 180 grams, for more durability.
Woofer–A **Speaker** usually larger than a **Tweeter**, responsive only for lower acoustic frequencies and used for reproducing sounds of low pitch that cannot be produced by a tweeter.

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I.M.I.T.K.

1: Vintage Equipment

Reel-to-reel Tape Decks

AKAI GX-266D REEL-TO-REEL TAPE DECK
(Made in Japan)

My father had one of these back in the seventies. This machine has excellent sound quality for an analogue tape deck. With its simple yet sleek design, the Akai GX-266D features a glass and X'tal ferrite head, two VU meters, direct drive, auto reverse, two tape speeds, and both way recording. Plug in a microphone or external source and get really good quality recordings.

AKAI 4400 STEREO CONVERT-A-DECK REEL-TO-REEL TAPE DECK
(Made in Japan)

So named because it allows you to use it as either a pure deck or a complete system. It features instant dual monitoring, pause control, automatic shut off, 4-track, 2-channel, stereo/monaural system, sound-on-sound, sound mixing, sound-with-sound, VU meters, etc.

AKAI X-355 CROSS-FIELD 4-TRACK REEL TO REEL DECK
(Made in Japan 1966)

An incredible reel-to-reel deck, the Akai X-355 can play tapes at 3 ¾ips, 7 ½ips, and 15 ips and has many automatic features, like auto stop, shut off, repeat, and reverse. Great for playing old tapes!

SONY TC-500A VACUUM TUBE REEL TO REEL PLAYER
(Made in Japan)

The Sony TC-500A is a fantastic stereophonic vacuum tube reel-to-reel tape deck that can play tapes at 1⅞, 3¾, and 7½ inches per second and fits up to 7” reels. It can play/record in 4-track stereo and play in 2-track stereo. The TC-500A has detachable speakers that form the carrying case lid. A classic design!

Receivers/Tuners

CRITERION MARK I STEREO RECEIVER
(Made in Taiwan)

First sold by Lafayette Electronics, the Criterion Mark I is perfect if you are looking for a smaller receiver to go in a work-room rather than part of your hi-fi system, although it can be added as such. It has inputs at the back to connect two sets of speakers (select either or both using the front-panel speaker mode), and it uniquely features both ceramic and magnet cartridge turntable inputs.

HARMAN-KARDON 800+ HOME STEREO QUADRAPHONIC AMPLIFIER/RECEIVER

The Harman/Kardon 800+ is an amazing amplifier/receiver with its quadraphonic sound (when that was all the rage) and sounds great when hooked up to four speakers.

MONTGOMERY WARD AIRLINE GEN 6901A FM AM STEREO RECEIVER
(Made in Taiwan)

The Montgomery Ward Airline GEN-6901A is a great receiver with lots of capabilities. It could act as an amp with its plentiful connections at the back for connecting two tape decks, a turntable, and an auxiliary.

MCS SERIES 3236 VINTAGE FM AM STEREO RECEIVER

A great receiver that was built to last, and like most receivers of the time also acted as an amp, giving out a nice warm tone and crystal-clear sound. It still looks good in any home audio system.

ROTEL RX-504 AM FM STEREO DC RECEIVER
(Made in Taiwan 1979)

The Rotel RX-504 stereo receiver has crisp sound quality and a great power output of 40W per channel, and like other receivers of the era could also act as an amp with plenty of inputs round the back.

MARANTZ MODEL 4270 VINTAGE RECEIVER STEREO 2-QUADRADIAL 4
(Made in Japan, 1974)

The Marantz Model 4270 Receiver Stereo 2-quadradial 4 is a top-of-the-line receiver with a range of adjustable features. Boasting a selection of volume and audio adjustments, this receiver also has plenty of speaker and other outputs so you can have the power to create an audio experience like no other.

Combos/Music Centres

REALISTIC CLARINETTE 66 AM FM STEREO CASSETTE MUSIC SYSTEM
(Made in Taiwan)

The Realistic Clarinette 66 is a perfect system for any young music lover. He can play cassette tapes and tune in to all the radio stations. Great for those who want to record directly from the radio. Good looking too with its shiny silver front and wooden side panels.

SONY HP-239A SOLID STATE STEREO MUSIC SYSTEM
(Made in Japan)

A great listening experience for those who had one of these. Sony appeared to be the ones in charge of the game. The SONY HP-239A is a record player and a cassette player and has a radio (with onside tape rack).

LLOYD'S AM FM MULTIPLEX 8-TRACK RECORDER AND PLAYER
(Made in Taiwan)

This Lloyd's classic combo can play 8 track tapes as well as record onto them directly from the radio. It also features a phono hook-up to connect a turntable, a headphones jack, and a stereo radio.

PANASONIC RA-6600 8-TRACK AM/FM STEREO RECEIVER
(Made in Japan)

A great looking and versatile unit, the Panasonic RA-6600 is a unique 8-track stereo receiver. The latter has strong reception and features a large analogue tuner, two meters, and a signal strength meter which doubles as a right channel recording meter when recording so you can see the various levels.

MACDONALD M270 AM FM MPX 8 TRACK STEREO PLAYER AND TURNTABLE
(Made in Taiwan)

This is a great combo that can play records, 8-tracks tapes and features an FM/AM receiver.

PANASONIC SE-3170 MUSIC CENTRE
(Made in Japan)

This is a very tidy combo. It can play/record 8 track tapes, play records at 3 speeds, and can pick up all the stations with its AM/FM radio. There is also a small compartment to store your 8 track tapes, which is handy. It also has a great sound. Just plug in a decent pair of speakers and away you go.

PANASONIC SE-1050 STEREO MUSIC CENTER
(Made in Japan)

The Panasonic SE-1050 is a neat three-in one system with a turntable that plays records at three speeds (33, 45, 78), plays cassette tapes (with storage space), and has a decent radio. All you need to do is plug in a good pair of speakers and you have music at your fingertips!

SEARS SOLID STATE STEREO SYSTEM
(Made in Taiwan)

This Sears system offers a powerful sound with its reliable build. It features a record player that can stack up to 8 records when fitted with an appropriate spindle and has 3 speeds (33, 45, 78). It also has a cassette deck and an AM/FM tuner with a small compartment for your tapes. The ultimate in sound fidelity!

REALISTIC 14-931 MODULAIRE 838 STEREO SYSTEM
(Made in Taiwan)

This Realistic Stereo System is a very tidy unit that can play/record 8 track tapes with a decent radio tuner. Much more than that, for it also allows connections to a turntable and/or a cassette player with its phono and aux inputs. A very versatile system.

SOUNDESIGN 6822 DUAL CASSETTE PLAYER STEREO SYSTEM
(Made in Taiwan)

The Soundesign 6822 is a neat music system. It can play records, record and playback cassette tapes (doing tape-to-tape), and has very good reception through the AM/FM tuner. Not sure of date of manufacture, but certainly late 1970's.

<u>8 Track Decks</u>

GENERAL ELECTRIC 8 TRACK PLAYER AM FM STEREO

This classic 8 track player can play and store your 8 tracks tapes in the compartment provided. It features a phono hook-up to connect a turntable, a headphones jack, a stereo radio, so it could also be considered a combo/music centre (without a turntable). Connect some speakers and away you go.

Record Players

BSR MCDONALD 3-SPEED AUTOMATIC TURNTABLE
(Made in Great Britain)

This BSR McDonald turntable offers three speeds (33, 45, 78) and a simple stop/start/auto switch, making it easy to sit back and enjoy your old records. BSR were the first to manufacture the auto-arm system.

PANASONIC SG-999D TURNTABLE
(Made in Japan)

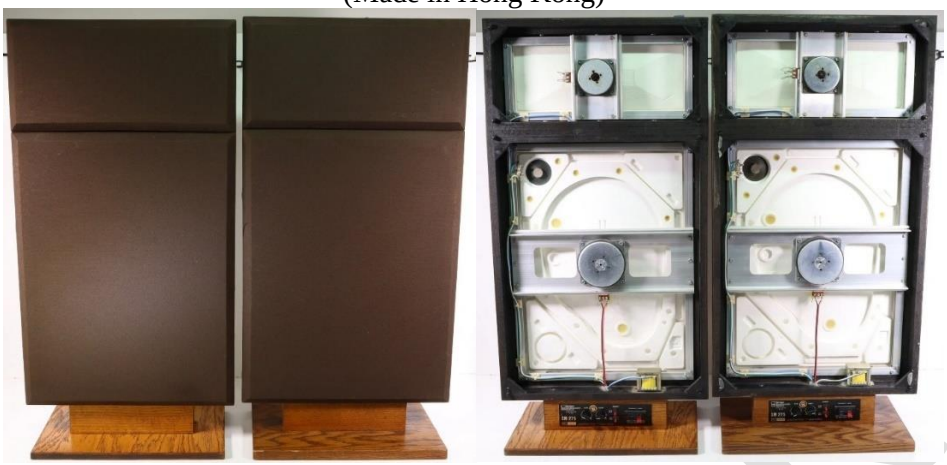
The Panasonic SG-999D is a belt-driven 4-speed turntable (16, 33, 45, 78) with a protective lid that folds back. It also has an AM/FM stereo receiver which features independent treble, bass, and loudness control knobs, along with simple FET tuning.

Speakers

BOSE 901 II DIRECT REFLECTING SPEAKERS

The Bose 901 II speakers have a unique sound, well rounded, despite their thinness. They look elegant too.

BES BERTAGNI SM275 FLOORSTANDING SPEAKERS
(Made in Hong Kong)



The ultra-cool BES Bertagni SM275 is a 3-way speaker with flat panels and amazing audio. The sound is wide open with a good strong bass. These funky, unique speakers still look good today.

LINN ISOBARIK WOODEN LOUDSPEAKERS
(1974)

These loudspeakers offer superior sound quality and are perfect for audiophiles seeking to upgrade their system. However, the price (in decent condition) today will set you back well over twenty grand (GBP)!

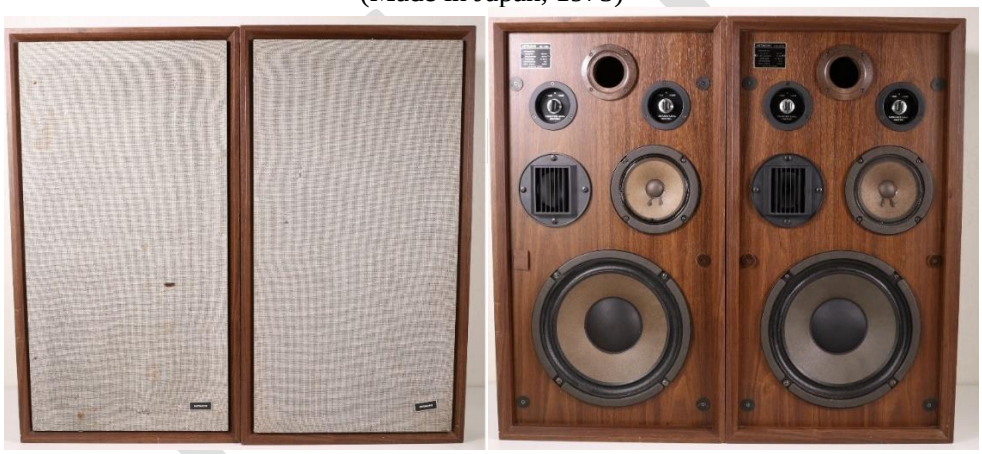
WHARFEDALE SUPER LINTON BOOKSHELF SPEAKERS
(Made in Great Britain)

Wharfdale speakers are synonymous with craft, respected in hi-fi circles, this pair have the purple tweeters.

DAHLQUIST DQ12 3-WAY FLOORSTANDING LOUDSPEAKER PAIR

A cool pair of speakers which are ‘Phased Array’ three-way, sealed-box, floor-standing, and sound great, with plenty of lows, middles, and highs. Front has a tan-coloured cloth grille, the top part of the tweeters are protected by a black metal grille and come complete with spiked feet to minimise vibration.

HITACHI HS-420 BOOKSHELF SPEAKERS
(Made in Japan, 1975)



The Hitachi HS-420 Bookshelf Speakers give out 40 watts per channel at 8 Ohms and have a great sound.

Consoles

BARZILAY MARANTZ TWENTY-SIX GARRARD 65B CONSOLE

Like the English Radiogram, this American Console can play records and has a built-in radio. A very bulky item that is now more of an antique than a music provider.

Jukeboxes

ROWE AMI R-87 JUKEBOX
(1979-1980)

This was an excellent system for setting up in your living room and for playing all your old 45s. You simply stacked them up in the back, made a note of where each one was and labelled it accordingly. A big, bulky unit (41.25” x 26.5” x 52”) which took up a lot of space but did have good stereo speakers.

I.M.I.T.

2: Modern Equipment

Hi-Fi Separates:
Amps

MISSION CYRUS ONE INTEGRATED AMPLIFIER

The Mission Cyrus One was my first proper amplifier. I loved it for its neutral sound and the fact it is quite small, although very heavy for its size due to its metal casing. I still use it today after 30 years as it has never failed me and is a good, reliable amplifier, with an excellent performance. My only regret is there are not enough inputs at the back, so if you need to add another device, you will have to remove one first. There was also the Mission Cyrus Two which was a signature power amp and pre-amp combination.

YAMAHA M-4 STEREO POWER AMPLIFIER
(Made in Japan, 1980)

This amazing power amplifier can churn out 120 watts per channel and has a great sound. It is very lightweight, at only 18.5kg.

YAMAHA AX-470 NATURAL SOUND INTEGRATED AMPLIFIER
(Made in Japan)

This is an awesome amplifier with a clear neutral sound.

YAMAHA M-45 NATURAL SOUND STEREO POWER AMPLIFIER
(Made in Japan, 1986-1988)

The Yamaha M-45 is a great stereo power amp that has a good range, capable of covering both sharp detail and deep bass. Like the above it also produces very neutral, accurate, and clear tones. The M-45 is a heavy (28 lbs) but solid, reliable component, built like a tank.

YAMAHA MX-460 NATURAL SOUND STEREO POWER AMPLIFIER
(Made in Japan)

The Yamaha MX-460 can give more power to your system without compromising sound clarity, and provides maximum audio clarity, giving a great range that covers both ringing highs and deep lows without distortion. It also has the function of independent speakers so you can either listen to the left channel, or the right, or both, and built heavy (21.5 lbs) like a tank for reliability.

CARVER M-200T MAGNETIC FIELD POWER AMPLIFIER
(Made in USA)

The Carver M-200T is an ultra-cool power amp that operates with the use of magnetic field technology. This results in a highly efficient system with little heat. Unlike other power amps that store large amounts of power in capacitors, this one uses a magnetic field coil that connects directly to the AC power output, so no shortages even at high peaks. It delivers an incredible amount of power in a tight, lightweight, compact case.

CARVER TFM-15CB POWER AMPLIFIER
(Made in USA)

This power amp has an amazing performance and great frequency response. The Carver TFM-15CB is a 2-channel amplifier and produces high-quality audio. It features a bridged mono mode, giving optimum performance with monophonic sound systems. Its power output is 140 watts (at 4 ohm) and 200 watts (at 2 ohm), providing a strong clear sound that will fill even a large room.

ADS ATELIER A2 INTEGRATED AMPLIFIER
(Made in Singapore, 1983-1985)

The ADS A2 Integrated Amp performs superbly with multiple inputs (for CD, phono, tuner, video, dual tapes) so you can connect up to 8 devices. It is the perfect amplifier for an enthusiast.

ELAN POWER Z300/301 POWER AMPLIFIER

The Elan Power Z300/301 features a 2-channel stereo input design that can power three sets of speaker outputs. It can be used as a distribution power amp or a standard stereo power amp with 150W at 2.0 ohms per channel, 100W at 4.0 ohms per channel or 60W at 8.0 ohms per channel.

AUDIOSOURCE AMP100VS STEREO POWER AMPLIFIER
(Made in China, 2021)

The AudioSource AMP100VS Stereo Amplifier can output up to 50W per channel at 8 ohms and 60W per channel at 4 ohms, giving perfect stereo which can be adjusted with rear-mounted bass and treble controls, and the front-mounted balance and volume controls. It also has two stereo RCA inputs with main/interrupt priority, and can be switched from A, B, or A+B speaker set up.

AUDIOSOURCE AMP102 STEREO POWER AMPLIFIER
(Made in China)

Like the above the AMP 102 is a big, robust system offering superb functionality. It has both High Current Capability and Dual-Zone Capability and produces an impressive, liquidly sound that will impress any audiophile who is looking to boost his home audio system.

CROWN CL1 2-CHANNEL POWER AMPLIFIER
(Made in USA, 2006)

The Crown CL1 gives excellent performance, flexibility, and power. Its system has an advanced 2-channel power which is notable for its high level of overload protection circuitry and can be mounted on a rack. It is 275 watts per channel into 8Ω (stereo) or 900 watts into 8Ω (mono).

ARCHER NO. 15-1279 DOLBY SURROUND AMPLIFIER

The Archer No. 15-1279 Dolby Surround Amplifier is an integrated amplifier with two separate channels, three L/R RCA inputs and offers stereo L/R RCA with a clear, crisp sound.

LINN LK140 STEREO POWER AMPLIFIER

The Linn LK140 is an efficient, reliable amplifier, a good choice for any audiophile's hi-fi system. In a compact casing, it boasts 140 watts per channels into 4 ohms so you get the power you need.

ORIGIN ACOUSTICS DSP2-200 AMPLIFIER

This DSP2-200 amp is a compact design with an impressive sound. It offers A/B speaker selection for 2 zones or a sub-out and easy to change volume/tone in each zone with independent controls.

NAD 1000 STEREO PREAMPLIFIER

The NAD 1000 has an elegant and simple front panel and provides a performance level equal to some pre-amplifiers costing twice the price. Plenty of inputs at the back for CD, tuner, tape and turntable, plus separate phono pre-amp circuitry, using discrete transistors in an optimised circuit.

NAD 3240PE STEREO AMPLIFIER

The NAD 3240PE stereo amplifier is a great addition to any audiophile's home audio setup. It features a phono input for turntables, and another seven analogue inputs for a variety of devices, like a CD player, tape deck, tuner, etc., so you won't run out of connections.

NHT SA-2 COMPONENT SUBWOOFER AMPLIFIER
(Made in Taiwan)

The NHT SA-2 is designed to power a subwoofer and is a strong and versatile monoaural amp optimized for powerful low frequency reproduction. Its Class G design enables cooler operating temperatures and has dual-rail power supplies for high-output, low-distortion audio.

TEAC SA-200 DC INTEGRATED STEREO AMPLIFIER
(Made in China)

An easily affordable amp for most aficionados of sound, the Teac SA-200 DC integrated stereo amplifier features multiple audio inputs, inc. a phono input for a turntable, and a handy built-in graphic equalizer that ranges from 63Hz to 16kHZ.

ONKYO P-304 STEREO PREAMPLIFIER
(Made in Japan)

The Onkyo P-304 Stereo Preamplifier is solidly constructed and brilliantly engineered to ensure an even frequency response, no crosstalk, smooth bass, and a laidback midrange. Featuring discrete signal path circuity, direct tone passive equalization, and a host of connections (inc. a phono for a turntable), this preamp is the perfect addition to any audiophile's home audio system.

PEAVEY CS800S 1200W PROFESSIONAL STEREO POWER AMPLIFIER
(Made in USA, 1992)

This exceptional amplifier from Peavey can deliver a massive 1200W of power in both stereo and bridged modes. Its advanced low noise technology ensures crystal-clear sound reproduction while the high-efficiency design reduces any ambient noise. With this professional-grade amplifier, you'll get reliable performance that won't let you down.

HARMAN/KARDON PA 2000 BRIDGEABLE MULTICHANNEL AMPLIFIER
(Made in Korea)

The Harman/Kardon PA 2000 Amplifier gives a powerful, clear audio and has a wide-bandwidth, high-current design, meaning it can effortlessly replay upper treble and lower bass, with better control over bass than other amps. This ensures you get strong bass, great dynamics, and top-notch speaker control.

KRELL S-300I STEREO 2 CHANNEL AUDIO INTEGRATED AMPLIFIER

A lovely looking machine that any audiophile would be proud of, the Krell S-300i Amplifier delivers 150 watts per channel (8 OHM speakers) and 300 watts (4 OHM speakers) and is very heavy at 45lbs.

ONKYO A-22 INTEGRATED STEREO AMPLIFIER
(Made in Japan, 1983-1984)

The Onkyo A-22 Integrated Stereo Amplifier has great audio quality and offers 4 line-level inputs and a powerful speaker system. It provides outstanding clarity with full-bodied sound for any type of music.

ONKYO AMPLIFIERS (M-5150 POWER AMP AND P-304 PREAMP)
(Made in Japan)

A great example of matching two amps from same manufacturer, the M-5150 is the Power amp and the P-304 is a Pre-amp that work in perfect harmony, complementing each other. The M-5150 has a massive 150 watts per channel at 8 ohms and easy A/B speaker switching for convenient operation. The P-304 is solidly constructed, brilliantly engineered to ensure an even frequency response, no crosstalk, and smooth bass.

NILES SI-1230 12-CHANNEL SYSTEMS INTEGRATION AMPLIFIER
(Made in China)

The Niles SI-1230 System Integration Amplifier is ideal for multiple speaker set-ups, equipped for up to 6 speakers to give an all-round sound. Each of its channels produce 30 watts RMS, or 360 watts total, but with ‘bridging’ it combines adjacent channels to put 80 watts for each bridged pair, or 480 watts total.

DENON AVR-591 HOME STEREO AMPLIFIER

The Denon AVR-591 is a great, versatile unit, featuring HDMI for video. It can connect up to 5 speakers, including a subwoofer, and is ideal for not only music but also home theatre with its 5.1 surround sound.

KENWOOD KA-127 STEREO INTEGRATED AMPLIFIER
(Made in Singapore, 1988-1989)

The Kenwood KA-127 is a great integrated amp with a powerful, clean sound, no hum or distortion. It features a built-in 7-band graphic equalizer, a VFD display where power output is displayed in real time. The back has inputs for a turntable and three AC outlets so other components can be connected.

KENWOOD KM-105 STEREO POWER AMPLIFIER
(Made in Japan)

The KM-105 is a heavy, compact design and impressive sound. It is a versatile amplifier offering A/B speaker switching for two zones, LED power indicators, and 2 switched and 1 unswitched AC outlets.

MARANTZ IA 2232 SB HOME STEREO AMPLIFIER INTEGRATED
(Made in China)

The Marantz IA 2232 is an integrated amplifier boasting a high current system with plenty of connections for a turntable, CD player, tape deck, etc., making it a superior quality product.

TRIAD PAMP8-100 8-ZONE AMPLIFIER

The Triad PAMP8-100 8-Zone power amp delivers high performance, reliability, and robust amplification for all the combined units in a compact design. It has a separate phono input at the back, with another seven inputs to connect various other devices.

Graphic Equalisers

REALISTIC 31-2005 STEREO FREQUENCY EQUALIZER 10 BAND EQ SYSTEM

The Realistic 31-2005 Stereo EQ is a great way to enhance the sound of your speakers, allowing you to adjust the settings to your own preferences, as different types of music can differ enormously.

ONKYO EQ-18 STEREO GRAPHIC EQUALIZER
(Made in Japan)

This Onkyo Equalizer is ideal for getting the perfect sound out of your system as songs do not benefit from the same set-up. With the EQ-18 you can change it accordingly.

OPTIMUS 31-2030 STEREO GRAPHIC EQUALIZER 10 BAND DIGITAL DISPLAY

The Optimus 31-2030 Stereo Graphic Equalizer is an excellent equalizer and will surely make your music and speakers sound much better when playing different types of music, revealing their true potential.

Tuners/Receivers

TEAC AG-790 AM FM STEREO RECEIVER
(Made in China)

The TEAC AG-790 Stereo Receiver has superior audio and is a powerful amplifier, equipped with multiple A/V inputs for a wide range of connections (inc. phono for a turntable), giving exceptional sound quality.

DENON DRA-345R PRECISION AUDIO COMPONENT / AM-FM STEREO RECEIVER

The DRA-345R is a great receiver/amp that will complement any audiophile's audio setup.

KLH KL-2400 STEREO RECEIVER AMPLIFIER
(Made in China)

The KLH KL-2400 is a powerful stereo receiver / amplifier, giving premium sound quality, featuring multiple inputs (e.g. VCR, AUX, CD and DVD), and class 2 wiring speakers for maximum audio fidelity.

HARMAN/KARDON HK 3370 STEREO RECEIVER
(Made in Korea)

The Harman/Kardon HK 3370 is a simple and sleek AM/FM Stereo Receiver that will complement any audio set-up. It delivers a high-current, ultra-bandwidth power for a clean, dynamic sound. There are multiple connections on the back (inc. phono for a turntable) to connect to other devices.

HARMAN/KARDON HK 3490 AV STEREO RECEIVER
(Made in Korea)

The Harman/Kardon HK 3490 is an incredibly sleek and powerful receiver built to last. It boasts 120 watts per channel of high-current, ultrawide-bandwidth power, promising to make all music sound alive.

MARANTZ TA 110 QUARTZ SYNTHESIZED STEREO COMBO
(Made in Japan)

The Marantz TA 110 is a two-part unit consisting of a stereo tuner (ST110) and an amplifier (PM110). The latter features a 5-band graphic equalizer, making it easier to control your sound system.

MARANTZ TA-60 AM FM STEREO RECEIVER
(Made in Japan)

Like the above, this is another version by Marantz of their combined units. The TA-60 is a nice mid-range unit combining the ST-60 Quartz Synthesized Stereo Tuner and the PM-60 Stereo Amplifier. It has great audio, with a 7-band built-in graphic equalizer, digital frequency display, and simple input selector.

NAD 7225PE AM/FM STEREO RECEIVER POWER ENVELOPE
(Made in China)

A simple amplifier like the NAD 7225PE packs a punch. It is sensitive enough to pick up subtle nuances of audio, yet powerful enough to smooth out harshness and distortion when in overdrive. It will maximize the sound of any input, e.g. radio, phono, tape, etc. The Power Envelope provides extra wattage when needed.

NAD T744 AV SURROUND SOUND RECEIVER
(Made in China)

The NAD T744 is a great surround receiver that offers superb present sound and is ergonomically designed for ease of use. It has Enhanced Stereo digital processing with plenty of connections at the back.

SONY STR-D1011S FM STEREO FM-AM RECEIVER
(Made in Japan)

The Sony STR-D1011S Stereo Receiver is a great unit, with an amp so you can plug in a turntable and other devices. It has a built-in EQ with multiple presets for getting the best sound possible.

SONY STR-GX57ES FM STEREO / FM AM RECEIVER
(Made in Japan)

Like the above without the built in EQ, the Sony STR-GX57ES Stereo Receiver is a simple and sleek machine that will complement any audio set-up, with plenty of connections at the back, allowing you to hook up other devices to enjoy a great time listening to music.

SONY STR-VX250 QUARTZ LOCK DIGITAL SYNTHESIZER FM STEREO AM-FM RECEIVER
(Made in Japan)

The Sony STR-VX250 is equipped with the ability to control bass, treble, balance, and more. It has cassette tape monitoring and the option to preset 30 different AM/FM stations. It also sounds great.

Tape Decks

TASCAM DA-30 MK II PROFESSIONAL DAT RECORDER DIGITAL AUDIO TAPE RECORDER

The Tascam DA-30 is a reliably robust digital audio tape recorder for DAT tapes. It is easy to use, sounds great, and has a host of facilities most audiophiles need. It is also rack-mountable.

PIONEER CT-WM77R DUAL CASSETTE DECK

The Pioneer CT-WM77R Dual Tape Deck 6-Cassette Multi Play is a neat box of tricks. You can load up to 6 cassettes in the left-hand tray and dub tapes in the right-hand tray. It can also randomly play tapes and repeat the process, ad infinitum.

NAKAMICHI DRAGON AUTO REVERSE CASSETTE DECK
(Made in Japan)

This is the very top range of high-quality cassette decks, and one of the most sought after that every audiophile dreams about owning. Called the Dragon, as it is a monster of a deck, the Nakamichi DRAGON will set you back around £7,125 for a second-hand refurbished model. The auto reverse function and capable of handling normal, chrome and metal tapes. A beautiful machine worth possessing.

NAKAMICHI CR-3A DISCRETE HEAD CASSETTE DECK PLAYER RECORDER
(Made in Japan)

A bottom of the range cassette deck, compared with the above, but nevertheless still a good deck. This is an excellent single cassette deck player with a high-quality build. It gives clear, robust sound whether playing back pre-recorded tapes or recording from other sources.

DENON DRM-500 SINGLE STEREO CASSETTE DECK PLAYER
(Made in Japan)

The Denon DRM-500 tape deck is a great machine that gives good quality recording, with recording level indicators that turn red if the recording is too loud. I've still got mine, now boxed up as I stopped using cassette tapes a long time ago. I never had any problems with it, and it doesn't chew up tapes either.

ONKYO TA-RW99 STEREO DUAL TAPE DECK
(Made in Japan, 1986)

The Onkyo TA-RW99 is a great solution for anyone wishing to play/record cassette tapes at the same time by doing tape to tape. Featuring dual playback capabilities, it plays back audio with crystal clear sound, and comes with auto-reverse and automatic tape selection (it can read the tape types inserted), as well as Dolby.

JVC TD-W354BK STEREO DUAL TAPE DECK

Like the above, the JVC TD-W354BK Tape Deck can copy tapes from the left onto the right tray and do dubs from any audio source. Great sound as well for the price.

KENWOOD KX-7030 STEREO CASSETTE DECK
(Made in Japan, 1991-1994)

The Kenwood KX-7030 is a 3-head, stereo cassette recorder featuring Dolby B and C noise reduction systems. It has a user-friendly set up, making it easy for anyone to listen to their tapes without fuss.

<u>Turntables</u>

LINN SONDEK LP12
(Made in Scotland)

Lauded by audiophiles the world over, this was the first serious turntable to be produced with the original intention back in 1972 of extracting every single bit of information out of the grooves of vinyl records, a mission it is still accomplishing today. The LP12 (named after the record size) is up there with the best turntables on the market, producing a good dynamic sound. As I have said, source is everything. Once you have a good source then it doesn't matter how good the speakers are, etc., the full sound is coming out as it should, helped by the addition of the Linn Ekos tonearm. Not cheap, but worthing investing in.

STANTON T60 DIRECT-DRIVE TURNTABLE

The Stanton T.60 Direct-Drive Turntable is middle of the range, and surprisingly for its time still allows you to play 78 RPM records, as well as 33⅓ and 45s. It has a detachable cover, a line/phono switch, and pitch control. The light on the side shows the turntable is rotating at the correct speed.

ARISTON Q DECK TRANSCRIPTION TURNTABLE

The Ariston semi-automatic, belt-drive turntable provides precision and has two speeds (33⅓ and 45rpm) and creates a well-balanced, inviting sound. It is a reasonable turntable for its price.

MITSUBISHI LT-22 PLL QUARTZ LOGIC CONTROLLED LINEAR TRACKING TURNTABLE

To break convention, the Mitsubishi LT-22 PLL turntable has the arm slide across during play using its linear tracking, rather than swipe across like conventional models. It has a moving coil (Boston MC-10) cartridge installed and looks great.

PRO-JECT TK 40 186580 DEBUT CARBON TURNTABLE

The Pro-Ject TK 40 186580 is a lower range of the turntables the company offers. This sleek and simple turntable is a great entry-level player for audiophiles who can't afford to add the top of the range decks to their systems. It has a sub-platter to dampen vibrations/reduce noise and sounds great.

PRO-JECT RPM 10 CARBON TURNTABLE

The absolute zenith of turntables, better than the Linn Sondek LP12, the Pro-Ject RPM 10 Carbon deck is the all-new high-end turntable with the ultimate in acoustic performance and luxurious configurations. Beautiful, stylish, looks good, sounds great, and very expensive. So don't expect much change from GBP 4000. And that doesn't include a cartridge! Oh, also, it takes over half an hour to set it up correctly.

S.E.E. REVOLVER TURNTABLE

Made by the S.E.E. Corporation, Warrington, England, the Revolver was my first 'serious' turntable as an audiophile. I purchased it in the late 1980's as it was very affordable for an audiophile like me. But don't be deceived by its cost, the Revolver packs quite a punch, especially when fitted with a Goldring (moving coil) cartridge. It is belt driven, which I loved. And I particularly liked the fact it was supplied with a pig,

the rubber plug to clamp the record in place. Unfortunately, I never use it now. It is stored away in the attic. It may not be in the top category of decks, yet for the price it is certainly worth it.

SONY PS-FL7II LINEAR TRACKING QUARTZ LOCK DIRECT DRIVE TURNTABLE

Like the Mitsubishi above, the Sony PS-FL7II is a linear tracking turntable, but this one is retractable. It stays hidden inside until required and features a quartz lock, two speeds (33⅓ and 45), and repeat option.

SONY PS-LX510 LINEAR TRACKING/FULLY AUTOMATIC TURNTABLE

Like the Mitsubishi LT-22 PLL, the Sony PS-LX510 Turntable also uses Linear Tracking. The needle slides across during play with accurate precision and can play 2 speeds. It also has auto return.

TECHNICS SL-QL1 DIRECT DRIVE TURNTABLE

The Technics SL-QL1 is another linear tracker with the arm sliding across the lid rather than the deck. It sports a dynamically balanced tracking tonearm, allowing for fully automatic operation. Other functions include record speed selection, two-speed forward and reverse search, and cueing with mute and repeat.

REALISTIC LAB-2200 LINEAR TRACKING DIRECT DRIVE TURNTABLE
(Made in China, 1986)

Another linear tracker (housed in the back of the deck), the tonearm slides across the turntable with accurate precision. The Realistic LAB-2200 is an awesome turntable.

SANSUI P-L95R FULLY AUTOMATIC DIRECT DRIVE FRONT LOADING TURNTABLE
(Made in Japan)

Looking more like a photocopier you'd find in an office, albeit a black one, the Sansui P-L95R is a computerised automatic turntable that loads from the front, like a typical CD player. It's a quirky machine and a unique piece of audio history, producing a great sound, full of clear highs and solid bass. It also has an auto reverse feature which is accomplished by two tonearms, one on the top, the other on the bottom.

<u>CD Players</u>

NAKAMICHI CD-4 CD PLAYER
(Made in Japan)

The Nakamichi CD-4 is a high-quality CD player. It boasts an 18-bit dual D/A converter and 8-times oversampling digital filter, creating a clear, well-defined sound. All types of music sound great with this.

TASCAM CD-A500 CD PLAYER CASSETTE PLAYER COMBO DUAL SYSTEM

The Tascam CD-A500 CD Player Cassette Player Combo is a handy unit for anyone who wishes to record their CDs directly onto a blank tape. Both are remarkably clear, with a good, all-round sound.

PIONEER PD-F109 100-DISC FILE-TYPE COMPACT DISC PLAYER MEGA CD CHANGER

The Pioneer PD-F109 is a super cool CD player with a front panel that opens up to reveal four racks into which you can load up to 25 CDs and it can hold 100 in total. Like the rack system you can load your collection of CDs into it and leave them there, then press play when you want to hear a CD.

SONY CDP-CX225 200-DISC CAROUSEL CD CHANGER
(Made in Malaysia, 1999)

Like the above, this Sony device can store and play a CD collection as it holds 200 CDs on a wheel, or carousel. It creates seamless playback of CDs. Just insert the CDs, set shuffle play and press play.

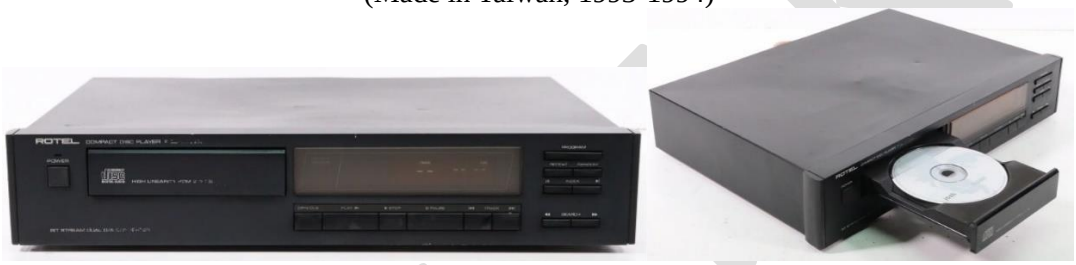
SONY CDP-CX335 MEGA 300 DISC CAROUSEL CD CHANGER
(Made in Malaysia, 2001)

Like the above, the Sony CDP-CX335 is a great piece of equipment. This CD player has a 300 CD capacity and will seamlessly shuffle all of them. The remote controller means you don't even have to get up from the sofa. You can connect a keyboard, name the disc, the device will automatically display the information.

SONY CDP-CX455 400-DISC CD PLAYER CAROUSEL MEGA
(Made in Malaysia)

Like the above, the only difference is this one holds up to 400 CDs. Again, you can name the discs by typing them in using the keyboard port if not a CD text. The info will display name of CD/track titles.

ROTEL RCD-865BX CD PLAYER
(Made in Taiwan, 1993-1994)



I had one of these. I changed from a Kenwood, which had problems, to a Rotel RCD-865BX, and never experienced any issues with it. Also, exceptional sound quality for the price.

SONY MXD-D40 COMPACT DISC / MINIDISC PLAYER

This combo unit is great for those who want a CD player and MiniDisc player and wish to save on space, without compromising performance. With the SONY MXD-D40 you can play a regular CD in the left tray, dub the CD to the blank Minidisc in the right tray. Also has an amp, so just hook up some speakers.

<u>MiniDisc Players</u>

SONY MDS-JB940 MINIDISC RECORDER AND PLAYER DECK
(Made in Japan)

The Sony MDS-JB940 Minidisc Recorder and Player Deck Optical Digital Audio is a great machine for those who still have MiniDiscs. It has an awesome sound to add to any audiophile's system.

Speakers

MIRAGE OMNISAT V2 FS CANDLESTICK SLIM TOWER SPEAKER

The Mirage Omnisat v2 FS Candlestick Slim Tower Speakers are a beautiful pair. They are tall and slim and will fit perfectly in the corner of any room and have a tremendous sound, an audiophile's dream.

TANNOY DC2000 SPEAKERS

These Tannoy DC2000 speakers I still use today. I have had them for over thirty years and never had any problems with them. When placed on speaker stands, they give a full, neutral sound with a good low-end extension and moderate level of transparency. Some complain they are not the most engaging speakers but are easy to listen to. And for their reasonable price, you cannot really complain.

BOWERS AND WILKINS CM1 CM2 STEREO SPEAKERS

The B&W CM1 and CM2 speakers are a beautiful design with a great sound. These mazing speakers are not that high, so if sitting in a comfortable chair, they will be on the same level as your ears.

DCM KX10 LOUDSPEAKERS

The DCM KX10 speakers deliver clean, crisp audio free from distortion, a great choice for any audiophile. And they are a reasonable price too, so not out of the range of most music enthusiasts.

DCM TIMEFRAME TF400 TRANSMISSION LINE LOUDSPEAKERS
(Made in USA)

The DCM TimeFrame TF400 loudspeakers are perfect for a wide range of music. Their imaging is wonderful, and they go deep thanks to their transmission-line design. They are 38” inches tall but measure only 7¾” deep, so don’t take up too much floor space. And they look great as well!

CELESTION F30 TOWER SPEAKERS

This is a very decent pair of speakers. The Celestion F30 are made from Port Brown wood giving them an antique look, but they sound awesome, especially when combined with the centre channel speaker.

POLK AUDIO RT600 TOWER SPEAKERS

These speakers, the Polk Audio RT600, not only look good, but sound great too, with a lot of bass and treble, not too high, nor too low, a good, round sound.

POLK AUDIO SDA 1A FLOORSTANDING SPEAKERS

The Polk Audio SDA 1A Stereo Speakers are a great addition to any audiophile's set-up as they sound absolutely amazing. The sound stage is huge, the detail fantastic. They are tall, standing 43.75" high!

POLKAUDIO RTI A7 TOWER SPEAKERS

The Polk Audio RTI A7 speakers are large but make a great pair when spatially distanced.

ATHENA WS-60 SPEAKERS (SMALL TOWERS)

The Athena WS-60 speakers have a great sound for the price and don’t stand too tall either.

DEFINITIVE TECHNOLOGY BP7002 BIPOLAR SUPERTOWER SPEAKERS

The Definitive Technology BP7002 speakers have built-in SuperCube subwoofers. They look great, sound great, and the subwoofers give them plenty of depth. Their three-dimensional soundstage and ultra-dynamic sound bring all music to the fore like you've never heard before. And they are tall, at over 47".

DEFINITIVE TECHNOLOGY PROCINEMA PROMONITOR100 MK II SPEAKERS

The Definitive Technology ProCinema ProMonitor100 MK II speakers are small but have a great sound.

ELITE AUDIO DIGITAL RESEARCH EA-2875 SERIES LOUDSPEAKERS

These are great speakers. The EA-2875 have a subwoofer built-in to the bottom of the tower.

JBL VENUE SERIES STADIUM TOWER SPEAKERS

The JBL Venue Series speakers are an amazingly powerful pair, with 225 watts per channel at 8 ohms.

JBL E60 NORTHRIDGE E SERIES FLOORSTANDING SPEAKERS

The JBL E60 Northridge E Series of speakers is ideal for the audiophile's home set-up. Featuring 8" shielded PolyPlas woofers, 4" shielded PolyPlas drivers, and ¾" shielded titanium-laminate dome tweeters, this unit provides powerful sound with accurate sonic detail. You can enjoy up to 360 watts peak power handling with maximum amplifier power of up to 175 watts.

JBL LX55 HIGH END STEREO SPEAKERS

This speaker pair is amazing. The JBL LX55 create a perfect sound that cannot be matched. They have a cool swivel base for turning them without scratching the bottom.

ACOUSTIC RESEARCH AR 5-CHANNEL SPEAKER SET
(Made in USA)

With this magnificent set of speakers, you can really bring music to life, and set them up also in a home movie theatre. Shown in the picture are a pair of 328 PS Tower speakers that have a tight loud bass, smooth mids, and nice highs; a pair of 216 PS Bookshelf speakers, small but mighty two-way speakers that deliver a great sound with a wide sweet spot and a smooth, warm sound; and a PSC25 Centre Channel speaker that delivers a clean, accurate sound to bring out the best in all audio sources.

ACOUSTIC RESEARCH M2 HOLOGRAPHIC IMAGING SPEAKERS
(Made in USA)

The Acoustic Research M2s make a nice pair of speakers suitable for any type of music. They are designed to give vocals and instruments a three-dimensional feel using 'holographic imaging.' Their audio is incredibly clear and accurate and give a surprisingly good bass output despite their compact size.

JAMO S426 TOWER SPEAKERS

The JAMO S426s are a great pair of speakers that stand quite tall, and perfect when placed either side of your armchair as they are just the right height. Clear, crisp sound with lots of bass.

KLIPSCH SYNERGY F3 FLOORSTANDER TOWER SPEAKERS

A great pair of speakers. The Klipsch Synergy F3s are a little rough round the edges, but they deliver.

KLIPSCH RF82 IV BLACK TOWER SPEAKERS

These speakers are amazing. The Klipsch RF82 IV deliver great sound, 150 watts per channel at 8 ohms.

YAMAHA NS-AP7800BLF SPEAKERS

This Yamaha NS-AP7800BLF speakers offer a superior sound quality in a sleek and stylish design. They have a woofer cone and tweeter and can deliver superior sound in both small and large spaces. The speakers have a wide frequency response and excellent sound clarity, making them a great for all music.

BOSE 501 SERIES V SPEAKERS

The Bose 501 Series speakers give out 200 Watts per channel at 6 Ohms and sound amazing.

MARTINLOGAN AERIUS ELECTROSTATIC LOUDSPEAKER SYSTEM

This is one of the world's most premier loudspeaker systems! The Aerius tower pair combines Electrostatic and Hybrid loudspeaker technology to create a well-balanced sound full of deep extended bass and low-level detail that reproduces a sense of instruments in a live acoustic setting. The centre channel’s sound complements the loudspeaker pair perfectly. It has shielded drivers, and you can use it to direct the sound to your optimal listening position. Combined, this space-saving system is a dream come true for anyone who appreciates a stunning audio experience.

SCIENTIFIC FIDELITY TESLA TOWER SPEAKERS

The Scientific Fidelity Tesla 00596 loudspeakers pump out crystal clear music with exceptional sound quality and true-to-life reproduction of details that will leave you mesmerized. Its cutting-edge technology and precision engineering offers distortion-free sound across a wide frequency range.

SONY SA-VA1 ACTIVE SPEAKER SYSTEM
(Made in Japan)

The SA-VA1 speakers incorporate a Dolby Pro Logic decoder and super woofers. This all-in-one speaker system features a floor-standing tower design, along with easy connection to your hi-fi.

NHT SPEAKER SYSTEM MODEL II PASSIVE SPEAKERS

The NHT Speaker System Model II speakers are amazing. They have sound that is clear, smooth and natural. Built with high-quality components, featuring advanced technology for accurate sound output.

SONY SS-MF650H PASSIVE FLOORSTANDING SPEAKERS
(Made in Japan)

The Sony SS-MF650H speakers are very nice. The sound is very high quality, boasting clear and precise audio quality, perfect for experiencing music in immersive detail.

SANSUI SP-5000 4-WAY, 7-SPEAKER FLOORSTANDING LOUDSPEAKERS
(Made in Japan)

The Sansui SP-5000 is a large pair of loudspeakers with 7 speakers each! They have a good sound that features clear highs and mids along with pounding, realistic bass. Great for heavy rock.

SOUND DYNAMICS RTS-7 TOWER SPEAKERS

The Sound Dynamics RTS-7 are a great-sounding pair! They have excellent imaging and a wide sweet spot. Plus, the bass is good, the highs are crisp and clear. They have an incredible soundstage and are sturdy,

Subwoofers

JENSEN JS800 100W 8” POWERED SUBWOOFER

Jensen’s JS800 is a top entry-level subwoofer and looks great. It has a nice sound and features a sleep circuit that saves power by switching the sub to standby mode when no signal is present.

ONKYO SKW-540 140W POWERED SUBWOOFER
(Made in Malaysia)

This SKW-540 subwoofer from Onkyo is a great addition to any home set-up. It boosts the bass so you can actually feel it, rather just hear it, and also features an auto standby function to save power.

YAMAHA YST-SW100 POWERED ACTIVE SERVO PROCESSING SUBWOOFER SYSTEM
(Made in Japan)

The Yamaha YST-SW100 is cool. It dramatically enhances bass response and is easy to connect to existing audio systems. Its active servo technology creates a strong, high-fidelity, low-frequency response.

TANNOY PS 110 ACTIVE SUB-WOOFER

The Tannoy PS 110 is designed to deliver powerful bass and an accurate audio experience. Its Boundary Gain Compensation switch dynamically adapts to the acoustics of any room. Perfect for an all-round sound.

Combos/Music Centres

BOSE WAVE MUSIC SYSTEM AWRC-1G CD PLAYER / RADIO TUNER

This Bose system sounds amazing. The built-in speakers produce a lot of bass with excellent sound. The Wave Music System features AM FM tuning. The AWRC-1G fits nicely on the shelf or any desk.

PANASONIC SA-AK27 STEREO SYSTEM
(Made in Singapore, 1999)

The Panasonic SA-AK27 features a wide range of capabilities, including connection of external devices, a subwoofer for impressive bass, a tuner for receiving radio stations, a dual cassette deck and a 5 CD player.

PANASONIC SA-PM313 MUSIC SYSTEM WITH SPEAKERS

The Panasonic SA-PM313 CD Player Cassette Deck AM FM Radio Music System is an awesome piece of equipment producing a very loud sound without distortion. Listen to CDs, cassettes, and the radio.

ONKYO PCS-05 STEREO MINI SHELF SYSTEM
(Made in Japan)

This cool system includes: the Onkyo C-05 Single Disc CD Player, the Onkyo R05 Amplifier/AM/FM Receiver, and the Onkyo K-05W Dual Cassette Deck. All it requires is a pair of speakers.

JVC CA-UXGP5 MUSIC SYSTEM

An excellent micro-music system. The JVC CA-UXGP5 enables you listen to CDs, the radio, and your iPod using the iPod docking station at the front. Small, compact, with bookshelf speakers that a great sound.

PANASONIC SG-P200/SF-630 MUSIC SYSTEM
(Made in Japan)

This system combines the Panasonic SG-P200 Radio with Cassette Tape Deck (you can record directly from the radio) and the SF-630 Front Loading Turntable (2 speeds: 33, 45). All it needs is a pair of speakers.

SHARP CP-DK257N SMALL STEREO SYSTEM

This is a great sounding system. My cousin has one of these and never had any problems with it. Sharp tend to be reliable, and this is no exception. The Sharp CP-DK257N features bookshelf speakers, a CD player, an amplifier, and a radio, also a docking station. I love the big silver volume knob. Every time you turn it up, it makes you feel powerful. Whack it out, loud!

RCA RS2620 STEREO SOUND MUSIC SYSTEM

The RCA RS2620 system features a wide range of capabilities, including connection for an external device, an AM/FM tuner, a dual cassette deck and 5 CD player. It also has a clock with programmable timer. For its compact size, it sounds great.

SONY MHC-EC68P STEREO MUSIC SYSTEM
(Made in China)

Enjoy your music collection on this stylish, compact, good sounding Sony stereo system. The Sony MHC-EC68P features an amplifier, CD player and AM/FM tuner, and is great for small rooms.

YAMAHA NATURAL SOUND MINI COMPONENT SYSTEM

The Yamaha CC-70W/CC-70S natural sound stereo system combines the following: the RX-S70, an AM/FM stereo receiver; the CDC-S90, a 3-disc CD changer; the KXW-S70, a dual cassette deck. It's a great 3-in-1 system. You can listen to CDs, cassettes, and the radio. All you need is a pair of speakers!

TEAC GF-450K7 STEREO SYSTEM

I used to have one of these in my workplace. You lift the lid and put a record on. The TEAC GF-450K7 features a compact turntable, a CD recorder, an AM/FM radio, and speaker system. With the CD recorder you can convert vinyl to a CD and play it back as a CD. Very convenient for transferring vinyl to CD.

3: Portables (Vintage and Modern)

Boomboxes

SONY CFD-S01 PORTABLE BOOMBOX

The portable Sony CFD-S01 is lightweight and versatile boombox with good sound coming from the stereo speakers. You can listen to cassette tapes, CDs, and radio. It uses batteries and can be plugged in.

PANASONIC RX-C38 PORTABLE RADIO STEREO COMPONENT SYSTEM
(Made in Japan)

The Panasonic RX-C38 is an incredible boombox in that it has an AM/FM radio, a cassette player and recorder, a built-in 5-band graphic equalizer as well, and two large speakers to blast out the sound.

LG CKM4 MINI HI-FI BOOMBOX SYSTEM

The LG CKM4 is a portable mini stereo that is lightweight and versatile. It plays back CDs and AM FM radio with a crisp, high-quality sound, has a remote control and nice speakers (the CKS43F) to match.

TOSHIBA RT-200S PORTABLE BOOMBOX

The Toshiba RT-200S Portable Boombox is a good-looking machine with a beautiful sound. It has AM/FM radio, a tape deck, two huge speakers that sound magnificent, although you can hook up external ones if need be, as well as connections for other devices on the back. A nice piece of equipment.

MAGNAVOX AW 7790 STEREO SOUND SYSTEM BOOMBOX

The Magnavox AW 7790 Stereo Sound System Portable Dual Cassette Player Recorder Boombox is an excellent piece of equipment that gives a really loud sound. It can do high-speed dubbing and recording from the radio. It's both power driven, and battery driven, with an in-built EQ for altering the audio. And the detachable speakers help to give a full stereo sound.

TOSHIBA RT-6015 AM/FM STEREO RADIO

The Toshiba RT-6015 AM/FM Stereo Rdio Cassette Recorder is a very high-quality and well-designed boombox. It has a cassette recorder and player for playing and recording tapes. It runs on batteries or plug it into the wall socket. Can also hook-up any device and has outputs for connecting external speakers.

Record Players

HAMILTON ELECTRONICS CORPORATION MODEL 930 RECORD PLAYER

This turntable speaker system can play four speeds (78, 45, 33⅓, and 16) and has a built-in speaker. Simply set it up where you want, plug it into the mains, and away you go. Sound, unfortunately, is in mono.

RCA VICTOR NEW VISTA PORTABLE TURNTABLE

This classic turntable is one of its kind with dual speakers that open out onto either side as part of its suitcase design. Having said that, it is hardly portable as it weighs several pounds. Best left in the home.

Cassette Players/Walkmans

SONY CFM-10 PORTABLE SYSTEM

Easily listen to a tape or the radio when carrying the Sony CFM-10 around. Requires 4 batteries.

PANASONIC RQ-309AS PORTABLE CASSETTE PLAYER

I used to have one of these. I was so broke as a teenager I could not afford to buy anything else. I got my mates to record their LPs for me and played the tapes back on this machine, listening to them through the in-built speaker. The Panasonic RQ-309AS has a built-in microphone, or you can plug in an external one.

PANASONIC RQ-2108 PORTABLE CASSETTE TAPE RECORDER

The Panasonic RQ-2108 comes with a microphone for recording. The unit can be plugged into a wall socket, or you can use batteries (which don't last long). Like the above, good for the price.

NATIONAL PANASONIC RS-253S CASSETTE PLAYER

The National Panasonic RS-253S can play/record tapes, tune into radio stations, but also has a phono hook-up for a turntable. There is an input for a microphone and for some speakers. Still sounds good today.

ONN MCR-976 PORTABLE CASSETTE PLAYER/RECORDER
(Made in China)

The ONN MCR-976 makes high quality cassette recordings of voice or other audio. Push the record button and away you go. Listen back through the built-in speaker!

SHARP RD-651AV CASSETTE PLAYER
(Made in Korea)

Another reliable tape machine from Sharp, the RD-651AV has a tape counter and built in speakers. It can either run off batteries or from the mains using attached A/C power cord.

RADIOSHACK CTR-122 PORTABLE CASSETTE PLAYER
(Made in China)

The CTR-122 is a nice little machine that was reasonably priced and quite popular at the time.

RADIO SHACK SCP-71 CASSETTE PLAYER WALKMAN
(Made in China)

Easily listen to cassettes with the Radio Shack SCP-71 Walkman, a very basic model but does have good sound when you plug in earphones or headphones. It was cheaper than a Sony, that's why I had one.

SONY SRF-85 SPORTS WALKMAN

With the Sony Walkman SRF-85 Player you can listen to the radio or a tape when you connect a pair of headphones or an auxiliary cable. It has a belt clip so it stays safe when you go jogging in the park.

SONY WALKMAN WM-FX244

With the Sony WM-FX244 Portable Cassette AM/FM Radio Walkman you can listen to cassettes through headphones or an auxiliary cable, also listen to local AM/FM Radio stations. This one has MegaBass which means it can pump out the sound harder, deeper.

SONY WALKMAN WM-FX244

This was my personal fave. I still have it somewhere, although as my listening has fully converted to digital, I no longer use it. But I thought the Sony Walkman WM-FX244 was great. I loved the black casing, and the fact it had a clock so you could set an alarm. Good stereo too.

Radios

PANASONIC RX-5200 PORTABLE AM/FM RADIO/CASSETTE RECORDER

The Panasonic RX-5200 is perfect for listening to the radio on the go. I had one which I used to put on the toilet next to the bath whilst having a soak. I used it to record songs off the radio, like the chart rundown on Sunday afternoons, and the quality of sound was good. The only drawback was it would eat up my tapes.

REALISTIC MINISETTE IV 14-831 AM-FM RADIO

The Realistic Minisette IV 14-831 is a radio with a cassette recorder. You can record directly from the radio. It also features several output connection types and built-in speakers. An antenna gives reliable reception.

Micro-cassette Players

SONY M-425 PORTABLE MICRO-CASSETTE PLAYER AND RECORDER
(Made in China)

Easy to use portable micro-cassette player/recorder from Sony. The M-425 has a built-in microphone to enable recording onto a micro-cassette. A MC60 gave you 30 minutes each side, enough usually to record concerts. Sound was not brilliant. You had to be careful where you stood: too close to the speakers, you got muffling; too far away all you could hear was noise on the playback. Good for up-close interviews.

SONY VOR M-530V PORTABLE MICROCASSETTE PLAYER AND RECORDER

The Sony VOR M-530V Portable Microcassette Player and Recorder can record & playback micro-cassettes with its in-built microphone and speaker.

CD Players/CD Walkmans (next page)

SONY CFD-S300 PORTABLE CD/CASSETTE PLAYER
(Made in China)

The portable Sony CFD-S300 player is a convenient way of listening to music on the go.

SONY D-F200 CD WALKMAN
(Made in China)

The Sony D-F200 Walkman has a built-in AM/FM radio so not only can you listen to your CDs but also the local radio. Just attach some headphones and away you go.

SONY ICF-CD843V TV/WEATHER/FM/AM 4BAND CD CLOCK RADIO
(Made in China)

The Sony ICF-CD843V clock radio/CD player is a great complement to any room with its AM/FM radio and CD player. It also has a built-in speaker, so no external hardware is necessary. It is ready to use.

MARANTZ CDR300 PORTABLE CD SYSTEM
(Made in Japan)

The Marantz CDR300 CD recorder is an extremely versatile machine with many unique features such as foot pedal compatibility and built-in speakers. It sounds great too. Pop in some batteries.

PHILIPS AX5311/17 PORTABLE CD PLAYER
(Made in China)

The amazing Philips AX5311 portable CD player is so light it is unbelievable and has a great sound quality too. With its high-tech design and its Digital Dynamic Bass Boost, you can optimize bass at any volume. CDs don't skip as Philips have included their electronic skip protection. It also comes with a neat case.

<u>MiniDisc Players</u>

SONY MZ-R50 PORTABLE MINIDISC RECORDER/PLAYER

The SONY MZ-R50 Portable Minidisc Recorder/Player allows you to play and listen to minidiscs when you connect this device to headphones or an auxiliary cable. One of the best Walkmans from Sony.

MP3 Players

APPLE iPOD 1G and APPLE iPOD 2G
(Made in America)

The Apple iPod may not have been the first portable MP3 player, but it was certainly the smartest. Whereas other players were large and clunky, the iPod was small and handy. First unveiled on October 23, 2001, it was the size of a deck of cards and weighed only 6.5 ounces, with 5GB of storage. This allowed it to hold and play about 1,000 songs, a number unmatched by other MP3 players at the time. As the device evolved over the years it grew to become 10,000 songs. Just plug in your earphones, touch the dial, scroll, find the track you want to listen to, press, and away you go, music at your fingertips. Brilliant. (There were another three generations of the iPod after these two. Apple stopped making the iPod in 2022.)

APPLE NANO TOUCH
(Made in America)

Apple's iPod Nano was a groundbreaking innovation in the portable music player industry. Introduced in 2005, it was a more compact and sleeker alternative to the iPod Mini. With flash memory for storage, the iPod Nano was lightweight and handy, quickly becoming popular among consumers who desired a stylish and portable way to enjoy music on the go.

SAMSUNG NAPSTER MP3 PLAYER

I couldn't afford an iPod so I settled for one of these, a Samsung Napster. Perhaps not as good, but cheaper. Like Apple's iTunes for the iPod, you had to import songs to the device using the Napster interface. It held less songs as well, although I must admit the sound was pretty amazing.

SONY NW-A306 WALKMAN

Sony, not to be outdone, brought out is own MP3 player, the NW-A306 Walkman. The sound quality is said to be very agreeable indeed, and it can hold plenty of songs on its internal memory, around 18GB. It seems strange people still bother with MP3 players when they have one in their pockets anyway (it's called a smartphone), but the Sony Walkman is specifically designed to enhance the sound and make functionality and performance its top priority. Not cheap, though. It sells for around GBP 250 / USD 300.